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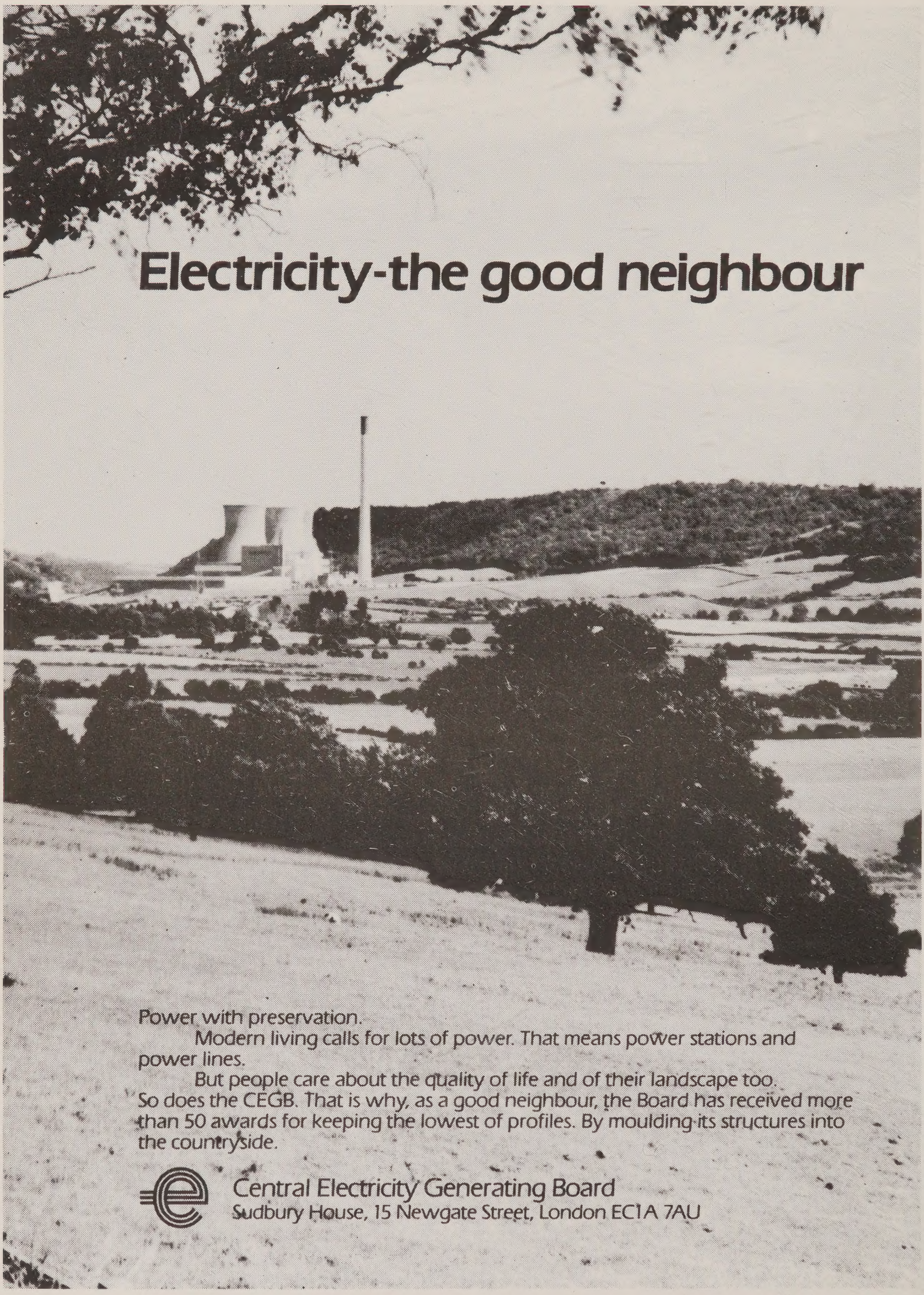

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EDITORIAL

WHAT NEXT FOR VEHICLE EMISSIONS?

NSCA was one of a wide-ranging coalition of environmental, consumer and industrial organisations which recently lobbied for the Budget increase in the differential between leaded and unleaded petrol. With the sales and availability of unleaded finally taking off, we can look back with some satisfaction on the long campaign to remove lead from petrol which, hopefully, is all but over. It will still be some time before lead-free engines predominate. A valuable side-effect of the debate has been an increase in public awareness of pollution issues in general, and we must now hammer home the point that lead is not the only aspect of vehicle emissions which gives cause for concern.

The recent NSCA campaign report *Dirty Diesels* (see this issue) focussed on the problem of particulate emissions from large diesels. A loophole in existing law means that the police will only prosecute vehicles which produce enough smoke to obscure vision. In a letter to NSCA, the Home Office admits that police involvement ". . .does not extend to responsibility for environmental matters. . .the question of air pollution is a matter for the Environmental Health Department". It does not explain exactly how it expects EHOs to act against smoky diesels! Particulate control will be aided by stricter emission limits imposed at EEC level. New proposals are expected from the Commission shortly, and NSCA will be lobbying for standards which compare with those to be introduced in the US.

In the UK road transport contributes 28% of hydrocarbon emissions, 45% of nitrogen oxides and 85% of carbon monoxide — and all these figures are rising. Strict emission limits are in force in many parts of the world, but the EEC response to date has been surprisingly half-hearted. Disputes between car manufacturers and between member countries, aimed at protecting markets rather than the environment, have resulted in differing standards. Surely the industry would benefit from emission limits which are consistent throughout the world? The means for controlling emissions are still a matter for debate, particularly the competing claims for lean-burn technology and catalytic converters; controlling the extent of car use is another controversial option. However the political ends cannot be in doubt; vehicle emissions remain one of the most serious sources of air pollution, and stricter controls are inevitable. Ultimately our demand must be for the EEC to match those standards already enjoyed in Australia, Japan and the US — and the sooner, the better.

NSCA NEWS

NSCA COMMENT

AIR POLLUTION CONTROL IN GREAT BRITAIN

In December 1988, the Department of Environment published a consultation paper setting out its proposals for which industrial processes should be subject to control by HM Inspectorate of Pollution (HM Industrial Pollution Inspectorate in Scotland) and which by local authorities. This consultation follows on from two previous consultations: In December 1986, the DoE published *Air Pollution Control in Great Britain: Review and Proposals* which among other things proposed extending the application of best practicable means (bpm) by giving local authorities powers of prior authorisation over a second tier of potentially polluting processes. A second consultation paper issued in July 1988 entitled *Integrated Pollution Control* proposed the introduction of a system of integrated pollution control for certain types of industrial processes that discharge significant quantities of harmful wastes. NSCA's responses to these consultation papers were published in *Clean Air*, Vol. 17, No. 2 (1987) and Vol. 18, No. 3 (1988), respectively.

The NSCA's Technical, and Parliamentary & Local Government Committees discussed the latest consultation paper in February, and their views, set out below, have been sent to the DoE. While the NSCA generally welcomes the consultation paper as another step in improving the UK air pollution control regime, we feel there are some points on which further clarification, or further comment, might be helpful.

1. Potential for Transfer of Control Authority

Whilst the control of a site by a single enforcement agency is considered to be desirable, it is evident that emissions of, for example, odour, dust and noise, from non-scheduled operations at scheduled works could generate complaints of nuisance which would inevitably fall to be dealt with by the local authorities. Odour is usually the major source of such complaints; where modification to the process is required, the remedy will lie in advice from HMIP. In such circumstances, the legislation should specify that where HMIP is responsible for an entire site, it would have a duty to consult with local authorities on areas which would otherwise be under local authority control. The key point is that there should be one overall pollution control authority per site.

2. Resources

In common with many bodies, the Society considers that the financial implications of implementing the proposals in the consultation paper have been seriously underestimated. No matter how practicable the suggested arrangements, unless adequately resourced, the result would be seriously detrimental to effective air pollution control. Pollution control officers at both local authority and HMIP level are experiencing an increasing workload without a concomitant increase in personnel and resources.

3. Proposed Two-Part Schedule of Works

The current schedule of works controlled by HMIP contains 58 categories of processes; it is planned to reduce these to 32, grouped under 6 main headings: fuel and power industry; producing and processing of metals or metal compounds; non-metallic mineral producers; chemical manufacturing industry; waste disposal industry; and other industries. This will align the Schedule more closely with the EC Framework Directive (84/360/EEC) on the combating of air pollution from industrial plant. Control for sites scheduled in Part A will be exercised by HMIP, and it is proposed that all such sites should be subject to integrated pollution control over discharges of specified wastes to air, water and land. Part B processes will not on the whole be subject to IPC, but will be prior controlled by local authorities.

NSCA views on those points for which comments were invited are as follows:

Large Combustion Works. Emission standards should be as strict for waste derived fuels as for bulk waste combustion which, from the pollution point of view, produces similar emissions.

Mineral Works. It is considered that all plant for the crushing and handling of coal should be included under Part B; since all such plant could present a major nuisance it would be inappropriate to apply a size limitation.

Glass Manufacturing Works. With regard to the proposal to schedule only those works capable of an annual production of 250 tonnes or more, the Society is concerned that this figure may be too low. The actual figure requires further study, possibly by survey. With regard to whether glass works should remain in Part A of the Schedule in the longer term, it is felt that as local authorities have longstanding expertise in the field it will be appropriate to return glassworks to Part B in due course.

Ceramic Product Works. The proposal to include gas fired kilns in the definition of "Ceramic Works" is approved. It is also felt that the manufacture of glazed tiles and common bricks should be included in the Part B definition.

Incineration Works. The Society welcomes the scheduling of hospital incinerators, but regrets that the opportunity was not taken to remove Immunity from all Crown Premises in respect of pollution control.

It is considered that the definition of plants for the destruction by burning of waste produced from chemical manufacturing processes (5.1a, Part A) should be expanded to include plant for the recovery of metal drums by burning out chemical residues.

There should be no lower limit on the size of plant disposing of clinical waste; 5.1b (Part B) relating to the incineration capacity of clinical waste or sewage sludge plants should be amended accordingly.

The NSCA welcomes the proposal to schedule (in Part A) all plant disposing of sewage sludge where the works has an aggregate capacity to incinerate one tonne or more per hour.

The NSCA is of the view that all crematoria should be scheduled under Part A so that local authorities — as the predominant owners — can be subject to impartial regulation. Animal incinerators should be scheduled under Part B.

Surface Coating Works

(a) *Paint Spraying.* The Society considers that restricting scheduling to those operations associated with manufacturing plant only will be too narrow: vehicle re-spraying is often a major business with odour presenting the biggest problem. Whilst the concept of scheduling represents the ideal, it would be costly to enforce. The existing law does not provide adequate controls in an area of genuine concern and it would be appropriate to provide local authorities with the necessary powers. One option would be to specify that vehicle spraying operations should all be scheduled under Part B except those painting, say, five or less complete private cars, or their equivalent, per day.

(b) *Surface Coating Operations.* It is considered that all surface coating operations which could give rise to any noxious substance or cause a nuisance should be scheduled.

Timber Works. The manufacture of timber and wood-based products where the processes involve toxic and solvent based materials should be scheduled in Part B. It is considered that limitations on types and sizes requires further study.

Offensive Trades. On-farm activities which would otherwise be included for regulation under the description of Offensive Trades, e.g. pig-breeding, should be scheduled under Part B.

4. Proposed Schedule of Noxious or Offensive Substances

The Society suggests that because of their importance chlorofluorocarbons should be specifically included in the list, despite being covered by the listing of chlorine or its compounds and fluorine or its compounds.

NSCA CAMPAIGN

DIRTY DIESELS

THE PROBLEM OF SMOKE FROM DIESEL ENGINED VEHICLES

Despite the introduction of various forms of emission controls, road vehicles continue to play a crucial role in the production of many air pollutants. These include hydrocarbons, oxides of nitrogen, carbon monoxide, lead and particulates. Vehicle emissions are implicated in a range of problems from local health effects to acid rain and the greenhouse effect.

Particulate pollution from diesel-engined road vehicles is a growing problem in the UK and is claimed to be a major source of smoke in our cities. Diesels are also unpopular with the public — in a recent survey 79% of those questioned considered air pollution from lorries and buses to represent a serious threat to the environment(2).

Research by NSCA shows that diesel use is on the increase, and that smoking diesels are a widespread problem. But an extraordinary loophole in pollution law means that the police can only prosecute offenders if they produce enough black smoke to obscure other drivers' vision — just a few hundred prosecutions are taken each year. Clearly, many thousands of grossly polluting vehicles are escaping control. However, there is no excuse for smoking diesels — a properly tuned and maintained engine should not produce any smoke at all. Negotiations are starting at EEC level to set new limits on emissions from new commercial diesel vehicle engines, and the UK must take a lead in pressing for stringent controls. Meanwhile the problem of controlling existing diesels remains.

Here, we summarise the main points of our report which was published at the beginning of March. It has been widely circulated to politicians, transport organisations, civil servants, and the police.

Why Worry about Diesel Smoke?

The impact of diesel emissions is heightened by their proximity to people — there is no "tall stack" dispersion for cars, vans, lorries and buses. The significance of diesel smoke emission is further enhanced by its chemical and physical characteristics. The major components are carbonaceous, of similar structure to carbon black, and with a very fine particle size. It is now realised that these characteristics imply consequences in terms of:

- soiling of buildings
- atmospheric visibility
- climatic effects
- atmospheric chemistry
- risk to human health.

Soiling

Particulate matter from diesels has a soiling power three times that of coal smoke(5). Table 1 shows motor fuels to be responsible for roughly one third of UK smoke emissions. Busy city street atmospheres can be polluted by 4 times as much smoke as non-streetside areas with as much as 95% of it from diesels(8). Calculations indicate that the majority of soiling in London comes from diesels, and it is to be expected that there will be a similar level of soiling attributable to diesels in other UK towns and cities(1).

Table 1 UK Emissions of Black Smoke 1985(5)

Source	Emissions (kt)
Coal	263
Smokeless Fuel	24
Fuel Oil	7
Gas Oil	3
Motor Spirit	13
Derv	128
Total	438

The costs of cleaning up the dirt are potentially enormous. In the UK, a recent study suggested that the annual turnover of the stone cleaning market could amount to some £490 million(9).

Atmospheric Pollution

The fundamental reason for soiling due to diesel exhaust smoke is the fine particle size and optical absorptivity. These same properties affect atmospheric visibility, by light absorption and could also influence climate, as a result of affecting Arctic snow melt rates and atmospheric radiation balance(5). Diesel exhaust is also a source of carbon monoxide (CO) — which has direct health effects — and oxides of nitrogen (NOx) — implicated in the formation of photochemical pollutants and acid rain. DOE figures show that levels of both CO and NOx are continuing to rise in the UK, and this is almost entirely due to road vehicles.

Health

While research on health effects of diesel exhaust suggests that if a risk exists, it is small(5), nonetheless, the fine particle size is such that diesel smoke will penetrate deep into the human lung where it may contribute to adverse respiratory effects. Diesel exhaust contains many hydrocarbon derivatives of the fuel which can have mutagenic and/or carcinogenic properties, which may be part of the soot or absorbed onto it. For instance it is thought that motor traffic (both diesel and petrol vehicles) is now the major source of polycyclic aromatic hydrocarbons such as benzo(a)pyrene(5). Recent epidemiological research in North America has shown signs of a possible link between exposure to diesel exhaust and human cancer. A study carried out by the US National Institute of Occupational Health and Safety and published in August 1988 suggests that diesel exhaust should be regarded as a potential occupational carcinogen affecting an estimated 1.35 million workers, and should be reduced to the lowest feasible exposure levels. The report concludes that studies with rats and mice "have confirmed the potential carcinogenicity" and that limited epidemiological evidence "suggests an association between occupational exposure. . .and lung cancer(11). Malignant tumours have been found in animals in recent exposure studies in Europe, though at exceptionally high doses(1).

Current Controls — New Vehicles

The UK and EEC standards for smoke emissions are based on visual observations of light obscuration. In 1963 the British Standards Institution used a panel of observers to grade vehicle emissions which were measured by smoke meter measurements of light obscuration. The standard established, BS AU 141 and amended to BS AU 141a was made legally binding in the UK Vehicle Construction and Use Regulations. Subsequently an EEC Directive, 72/306, based on regulations developed by the United Nations Economic Commission for Europe, was also adopted; the standard was based on measurement of smoke made by a different smoke meter to that used in the UK, but agreement was reached that BS AU 141a was a satisfactory alternative to the standard of Directive 72/306. These standards apply to new vehicles as constructed. Subsequent performance on the road is subject to legal control governing smoke emission.

Current Controls — Vehicles in Use

Smoke from diesel vehicles on the road is controlled by the Motor Vehicle Construction & Use Regulations, SI 1078 (1986). There is a general requirement that every vehicle should not be allowed to emit "avoidable smoke or avoidable visible vapour"; and the excess fuel device must not be tampered with.

HGVs undergo a subjective smoke emission test during their annual test. This so-called "free acceleration" test involves taking the engine to maximum revs four or five times. The vehicle inspector then makes a judgement about whether the smoke plume emitted on the final acceleration is a visibility hazard. Figures for 1987-88 show a failure rate of just 1.175%.

On the road the situation is different. In May 1987, a Department of Transport roadside survey of 33,913 HGVs showed that 7.7% were emitting excessive smoke — once again based on subjective visual criteria(6). Extrapolated to the whole HGV diesel fleet, this would suggest over 38,000 badly smoking HGVs — to say nothing of buses, lighter goods vehicles and cars. Yet the Home Office has told NSCA that there were just 338 prosecutions for "emissions of smoke causing danger" in 1986 — the latest available figures.

NSCA Action

Concern about the growing number of diesel vehicles emitting excessive smoke, in the 1970s, led the NSCA to call for a tightening of the smoke emission standard for new vehicles — the "limit for smoke opacity acceptable to 50 per cent of observers", as enshrined in BS AU 141a. The NSCA believed that a more severe smoke opacity limit, based on at least 75% acceptability, should be implemented, and urged the government to seek a revision of the relevant EEC Directive to this effect. However, the visual acceptability criteria remain subjective and in the long term, in the light of new information on the effects and risks posed by diesel smoke, the whole basis for standard setting must be changed.

An EEC draft Directive COM(86)261 on particulate emission from diesel cars acknowledged the health-related concern and proposed basing control on the mass of soot emitted, rather than on some subjective judgement of smoke opacity. A mass-based emission standard is subjective judgement of smoke opacity. A mass-based emission standard is easier to measure and enforce. A common position was agreed on COM(86)261 in December 1987, but the limits proposed only defined the status quo — 80% of current diesel car models already meet the standard and the remaining 20% will do so after some "tinkering" adjustments in design. Furthermore, the EEC proposal related only to diesel cars and did not cover lorry and bus emissions.

However NSCA understands that new proposals for diesel emission controls will be produced by the European Commission in advance of the June meeting of Environment Ministers. This represents an opportunity for the UK to press for the introduction of the strictest possible limits, parallelling those developed in the US where new standards for new heavy duty diesel vehicles were introduced in 1988 setting a maximum of 0.60 grams of particulate per Brake-horsepower hour (g/bhph). This figure will be tightened to 0.25 in 1991 and further to 0.10 in 1994. Because of particular concern for controls in urban areas, the 0.10 standard will be required of buses by 1991.

NSCA recommends that

- the present diesel smoke emission standards, based on "visual amenity" considerations, must be replaced by standards based on the mass of smoke emitted and which would reduce these emissions substantially.
- new and more stringent emission standards should be introduced for all categories of diesel vehicles, from cars to trucks and buses, as a matter of priority. The UK should press for new EEC legislation to match the US 1991 standards as a minimum.
- in-use vehicle smoke emission should be monitored by means of visual roadside checks, and at the annual DTp test, using agreed criteria. Police powers in this area must be clarified and strengthened; the increased use of the vehicle rectification scheme offers one option for more effective enforcement.
- research into the impacts of diesel particulate emissions on health, buildings, atmospheric visibility and the environment at large should be expanded, as should R & D on abatement technology. The development of simple equipment for measuring particulate mass emissions from in-use vehicles is a prerequisite for enforcing better standards.

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Dirty Diesels: The Problem of Smoke from Diesel Engined Vehicles, is available from the NSCA price £5.00, inclusive of postage and packing.

AGRICULTURAL POLLUTION

In 1987, NSCA surveyed environmental health departments in the UK to find out how serious pollution from agricultural activities was felt to be. The results were published in *Clean Air*, Vol. 18. No. 1 (Spring 1988). Two hundred and sixty responses were received of which 201 considered that agricultural activities created actual or potential problems in their areas. Ninety-eight per cent gave odour as the main problem. Other major categories of nuisance were straw and stubble burning (65%); noise (57%); and pesticide use (41%).

However, remedies for dealing with agricultural pollution are somewhat patchy. Most powers available to environmental health departments arise under the Public Health Act 1936 nuisance provisions. They are able to act only when nuisance is created, and have no powers of prior approval for new agricultural developments or activities. Under the Public Health (Recurring Nuisances) Act 1969, an authority can take action against an expected nuisance if it has occurred on the same premises in the past. Pollution legislation specific to agriculture covers the following areas: aerial application certificate (pesticides); agricultural chemicals approval scheme; discharge of effluent into sewers; guidelines on ground crop sprayers; model bye-laws on straw and stubble burning; disposal of waste on land; pollution of water by discharges due to agricultural practices.

From our survey, and subsequent research, it has become evident that there is surprisingly little published information on the subject of pollution control and agriculture; this is particularly true for information on the way in which the various aspects of pollution control law and regulation are applied to farming on a day to day basis. The last thorough investigation of the subject was the 1979 report from the Royal Commission on Environmental Pollution *Agriculture and Pollution.*

NSCA has therefore decided to set up a working party to review existing powers for controlling agricultural pollution and their effectiveness; the working party will draw up policy recommendations, which following endorsement by the Society will form the basis for our future campaigning on this important area of pollution.

CLAY PIGEON SHOOTING

The NSCA has supported the Government's action in tightening controls on clay pigeon shooting. Under the new General Development Order the number of days on which clay pigeon shoots can take place on a piece of land, before planning permission is required from the local authority, has been reduced from 28 to 14 days. Sustained lobbying, however, by the Clay Pigeon Shooting Association forced the Government to seek comments on the Order. In a letter to the Department of the Environment, NSCA in commenting on the opposition of the CPSA and the shooting lobby to the new Order, said: "Nowhere is it acknowledged that club activities represent a substantial nuisance in many countryside and urban fringe areas, and nowhere is it explained exactly why the clubs are reluctant to apply for planning permission. This could be interpreted as a tacit admission that clay pigeon shooting is an inherently noisy activity, and that the clubs are unwilling to submit to restrictions which might limit their activities in the interest of society at large. The truth is that with good planning, simple noise abatement techniques and reasonable controls on timing of shoots, clay pigeon shooting is perfectly acceptable in many locations".

NORTHERN DIVISION

Forty-five members attended the Autumn meeting of the Division at Blyth Power Station, Bedlington, Northumberland, 2 December 1988. Mr. E.J. Wormald, Station Manager, his senior staff and Mr. P. Owens, Scientific Officer, CEGB gave an illustrated talk on the development of the station, the methods used to minimise disturbance to the local environment, the contribution to the national grid system and proposals for further improvements to the advantage of the community and environment. Mr. Owens developed further the information concerning research work into the potential for alternative methods of developing energy, furthering commercial usage of the ash, which is a by product of this coal fired station. The members were then entertained to a buffet lunch provided by the Power Station.

Councillor C. Buglass, Wansbeck District Council, in proposing a vote of thanks, readily recognised that on occasions the local community has experienced problems from the power station. The juxtaposition of housing development and the station presented its own intrinsic difficulties. Having said that, he knew that the station management were very active in adopting measures to minimise problems and worked closely with the residents' liaison committee.

Following its meeting on 10 March, hosted by Esso Petroleum, Dr. R. Barnes (Esso Research Division) gave an illustrated talk on 'Acid Rain, Transportation Over Very Long Distances'. In a most informative talk , he referred to the history of trans European pollution and its effects on the environment. The slides and diagrams used vividly demonstrated the nature of the problem, in particular the areas of highest pollution. Many examples of work being undertaken to reduce the emission and impact of the 'fallout' were given. Mr. R. Emerson in proposing the Vote of Thanks to Dr. Barnes, not only commented on the extremely lucid manner in which he dealt with the topic, but congratulated him on the fullness of his answers to the range of questions he was asked.

EAST MIDLANDS DIVISION

The Division has notified the Society of the death of Mr. George Drabble at the age of 82. Mr. Drabble was Hon. Secretary of the East Midlands Divison from 1967-71.

Correction

In the last issue of *Clean Air* (Winter 1988), we mistakenly referred to Mr. Eric Raven as Chief Environmental Health Officer of Derby County Council. He is in fact Assistant Director (Environmental Health) of Derby City Council. Mr. Raven who was made an Hon. Member of the NSCA at last October's AGM also tells us that he was responsible for bringing smoke control to the whole of Derby over a period of 25 years (1960-85).

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REPORTS

AUTOCATALYSTS AND MOTOR VEHICLE EMISSION CONTROL

by
Dr. J.W.S. Longhurst
Director
Acid Rain Information Centre

A first version of this paper was read to the Manchester Area Pollution Advisory Council meeting at Rossendale, 17 January 1989. The views expressed are those of the author and are not, necessarily, the views of the Acid Rain Information Centre (ARIC), the Manchester Area Pollution Advisory Council or the Association of Greater Manchester Authorities. The Acid Rain Information Centre is supported by the Association of Greater Manchester Authorities.

Introduction

Motor vehicle exhaust is a significant and growing source of air pollutants. The world has witnessed a major growth in the car population from 50 million in 1950 to an estimated 350 million in 1988, with a projected total car population of 500 million by the year 2000(1). Growth of this scale creates many pressures which can be difficult to solve but that of air pollution can be effectively dealt with through the use of catalytic control systems. The requirement for effective control is most apparent in the world's largest car market, the European Economic Community, which has in excess of 105 million cars on the roads with a projected population of 130 million by the year 2000(2). In 1988 the United Kingdom contributed some 20.5 million cars and light duty vans to the EEC total(3).

In 1988 the EEC finally agreed a new set of regulations to control motor vehicle emissions, some 18 years after the United States first introduced tough standards(4). However the EEC regulations have been criticised by both environmental groups and the motor manufacturers for neither protecting the environment nor giving a clear lead to motor manufacturers. Consequently there is likely to be continued demands for the introduction of tougher regulations which are comparable to the existing United States standards. The US standards can only be met by the use of catalytic converters to control exhaust emission. Despite the lack of guidance given by the EEC the West Germans and Dutch have pressed ahead with tax incentives to encourage the purchase of cars meeting US standards, and in 1987 there were estimated to be over half a million catalyst equipped cars on European roads(5). In West Germany some 50% of new cars sold now meet the low pollution criterion and 33% of new cars are equipped with three way catalysts(6).

Production of Air Pollution in a Petrol Engine

The internal combustion engine converts heat, generated by burning fuel, into mechanical power. What comes out of a car exhaust depends upon the fuel and the engine. Petrol is a mixture of hydrocarbons formulated to give the best set of properties for spark ignition engines. When compressed in the combustion chamber the fuel-air mixture contains hydrocarbons, nitrogen and oxygen from the air, and traces of elements like sulphur present in the fuel. In a totally efficient combustion process hydrocarbons and oxygen will react to form carbon dioxide and water. However, the combustion process is never perfect and a range of other reactions are possible. Some of the hydrocarbon fuel is only partially burnt and forms carbon monoxide and water, still other hydrocarbons are caught in the crevices within the engine and do not get combusted at all(7). These can, and often are, emitted from the exhaust as unburned hydrocarbons. During the combustion process the temperature can reach 2000-2500°C. At these temperatures nitrogen and oxygen, from the air in the combustion chamber, react to form nitrogen oxides(8).

Thus, while a large number of individual air pollutants may be emitted with vehicle exhaust there are two groups and one individual air pollutant that concern and on which regulation is focused:

(i) nitrogen oxides (NOx)
(ii) reactive hydrocarbons (HC)
(iii) carbon monoxide (CO)

Motor vehicles are a very significant contributor to gaseous air pollution and in particular they are a significant source of nitrogen oxides, hydrocarbons and carbon monoxide. In 1987, the last year for which full figures are available, motor vehicles contributed 45% of the 1,031,000 tonnes of nitrogen oxides, 85% of the 4,470,000 tonnes of carbon monoxide and 28% of the 664,000 tonnes of hydrocarbons emitted in the UK(9).

Catalytic converters are a commercially available control technology able to significantly reduce this air pollution burden, at relatively low expense without unduly affecting vehicle performance and fuel consumption(10). This stringent control of emissions is only possible under all operating conditions of speed and power by means of catalytic converters. In the United States motor manufacturers abandoned the development of lean burn engines in favour of catalysts as it was recognised that total elimination of pollutants at source was not technically possible but required exhaust after treatment.

Catalytic Systems

A catalyst is a substance or group of substances that will accelerate the rate of a chemical reaction without being consumed in the reaction. Catalytic converters, which are available in a variety of forms are capable of substantially reducing all these emissions by converting the pollutants into carbon dioxide, water and nitrogen. The most widely used system consists of a cylindrical ceramic body with a honeycomb structure which is chemically treated and coated with platinum group metals. The honeycomb structure enables a high surface area (often equivalent to two or three football pitches) to be incorporated within a relatively small space(11). This is critical to the durability and reliability of performance. The catalyst is usually incorporated into the exhaust system of the car(12).

Three basic types of catalyst are available: oxidation, three way and diesel.

The oxidation catalyst controls the emission of HC and CO by oxidising the pollutants to water and carbon dioxide. Advanced lean burn engines require the use of an oxidation catalyst if satisfactory control of HC emissions is to be obtained. Whilst such an engine, under certain driving conditions, can reduce the formation of nitrogen oxides it also increases emissions of HC. In combination with a lean burn engine an oxidation catalyst ensures efficient control of NOx, HC and CO. The three way catalyst provides efficient, simultaneous, removal of NOx, CO and HC. The catalyst is a combination of platinum-paladium-rhodium which allows nitrogen oxides to be reduced to elemental nitrogen whilst oxidising the other pollutants of concern. Three way catalysts require electronic fuel control if they are to work most efficiently and thus there is a minimal loss of engine performance and fuel economy compared to a non-catalyst car(13). A diesel catalyst controls the HC emission, which gives the characteristic odour to diesel, and CO. The catalyst will also substantially reduce smoke emissions.

Need for Lead Free Petrol

Oxidation and three way catalysts require unleaded petrol as lead will slowly poison the action of platinum group metals. Diesel fuel is unleaded. The introduction of lead free petrol in the UK began in 1986 and is becoming increasingly more available at petrol stations although there appears to be strong consumer apathy to the use of the product. It is likely that consumer interest will increase in line with tax incentives to encourage uptake and a strong public awareness campaign funded by government and certain of the multi-national oil companies. Currently unleaded enjoys a 5.9 pence* per gallon price advantage over leaded fuel but this is not sufficient to encourage uptake and unleaded still accounts for only a very small percentage of total petrol sales. Price discounting by garages often brings the price of leaded fuel down to that of unleaded and this acts to restrict consumption. In West Germany consumption of unleaded fuel only increased significantly as a result of a 10 pence per gallon price advantage and as the result of a substantial rise in the number of catalyst equipped vehicles which require the use of unleaded fuel. By October 1989 all new cars for sale in the EEC have to be able to run on unleaded fuel. New models in existing ranges must comply by October 1990

**Increased to 10p in the 1989 Budget*

unless major engineering work is required(14). In the UK the government expects some 2% of new cars will not be able to comply with the regulations by 1990(15).

Catalysts have been used extensively since the mid 1970's in both the USA and Japan and have more recently been introduced in Australia and West Germany. Canada, Austria, Switzerland and the Nordic countries also require the use of catalytic converters to meet national emission regulations based upon the most recent US standards(16). In these countries and in cars produced by their motor manufacturers, catalysts have proved to be the most effective technology yet developed for reducing pollution from motor vehicles.

The Environmental Requirements for Catalytic Control

Europe has been slow to act on the link between vehicle emissions and environmental pollution. Directly and indirectly vehicle emissions of pollutants make a significant contribution to the formation of acid deposition, help create photochemical smog and are a potential risk to human health.

The major gases leading to the formation of acid deposition are sulphur dioxide and NOx. Power stations contribute about 65% of the total UK sulphur dioxide emission and about 40% of the NOx(17). Vehicle emissions are responsible for a further 40% of the UK NOx emission. In urban areas the proportion of NOx arising from vehicles is much more important than that from power stations. The atmospheric chemistry of nitrogen oxides is quite complex but at its simplest NOx arising from motor vehicles may either be oxidised to nitric acid or react with HC to form ozone.

Acid Deposition: Nitric acid will directly affect the environment, accounting for perhaps one third of acid deposition. Long term monitoring of atmospheric deposition at Rothamsted indicates a significant increase in nitrate deposition(18) whilst soil nitrogen saturation is now being reported from forest ecosystems in Scandinavia(19). Previously nitrogen had always been a limiting element in plant productivity. Ozone is phytotoxic and will also promote the oxidation of sulphur dioxide to sulphuric acid. Thus it too is of importance in the formation of acid deposition. Forest ecosystems across the whole of Europe are now affected by decline; in the UK the Forestry Commission figures suggest that some 55% of British broadleaved trees and 67% of conifers exhibit some form of damage(20). Whilst some of this damage is likely due to a range of natural factors, eg climatological stress or pathogen attack, a growing body of opinion links it, in a number of ways, to air pollution. In a recent comparison of forest health the United Nations Economic Commission for Europe found that British forests exhibited a high intensity of forest damage which may be comparable in intensity to that experienced in the Netherlands, West Germany, Switzerland and Czechoslovakia(21). The Forestry Commission maintains that this damage can be adequately explained by factors other than air pollution.

Smog: Photochemical smog is the result of the sunlight stimulated reaction between HC and NOx leading to the formation of low level atmospheric ozone and other chemical oxidants such as peroxyacetylnitrate. Such smogs and hazes are typical of warmer cities but their occurrence has been noted in the UK(22). The formation of such conditions in Californian cities was, in part, the environmental impetus for air quality regulations in the United States which favoured the use of catalytic converters. Between 1968 and 1988 US emissions from mobile sources of hydrocarbons fell by 96%, of carbon monoxide by 96% and nitrogen oxides by 76%(23). This was despite a significant increase in both total number of vehicles on the road and miles driven per vehicle(24).

Health: Health risks associated with gaseous car exhaust emissions have traditionally been associated with carbon monoxide. Exposure to elevated concentrations of carbon monoxide will reduce the oxygen carrying capacity of the blood as the affinity of haemoglobin for carbon monoxide is some 200 times that for oxygen(25), thus the heart has to work harder and this stress can exacerbate cardiac ailments. Chronic respiratory complaints may also be exacerbated. There is some evidence that fetuses and young children may be most at risk from carbon monoxide(26). More recently concern has been expressed regarding the impact of nitrogen oxides upon human health; exposure to elevated concentrations of NOx will increase airway resistance, and cause a decrease in pulmonary function(27). Sufferers from emphysema and chronic bronchitis may be most at risk(28). Release of hydrocarbons also gives rise to concern due to the possible carcinogenicity of many HC's routinely emitted through the exhaust pipe. These include harmless species like methane but also aromatics such as benzene, toluene, ethyl benzene and xylene(29).

Impact of Catalytic Systems

The environmental and health implications of partially, or uncontrolled, vehicle emissions provide strong reasons for insisting on the most effective control technology available. Catalytic converters are able, under all driving conditions to produce reductions of better than 90% in the emission of HC and CO and 75% in the case of NOx. Uptake of catalytic converters has proceeded swiftly in a large number of countries including the three countries who dominate world car manufacturing — West Germany, Japan and the USA(30). However, within the EEC there has been reluctance, by France, Italy and the UK in particular, to see the introduction of catalysts. Arguments against have focused upon the impact of catalysts on technology innovation (eg lean burn engines), reliability and expense, engine performance and impact upon the motor industry.

Lean burn engine technology offers improved fuel efficiency and is a relatively recent development. Lean burn will substantially reduce NOx emissions under certain driving conditions, particularly at cruising speeds, but a simple oxidation catalyst is required if HC emissions are to be properly controlled. Lean burn engines are designed to give an air-fuel ratio of 18:1-21:1 (in a normal engine it is 14.7:1) which will give low NOx and CO emissions, moderate engine power and good fuel economy(31). These advantages are at the expense of increased hydrocarbon emissions and attempts are now being made to reduce the number of places in which hydrocarbons can hide without burning in the combustion chamber. The NOx advantage of lean burn engines is only found under cruising conditions; as soon as the vehicle accelerates the extra power demanded from the engine moves the combustion conditions away from lean and results in an increase in the NOx emission. Thus to operate efficiently under all driving conditions a three way catalyst is required.

The two technologies are therefore compatible and adoption of catalytic control will not preclude the further development of lean burn technology. The scale of reduction in emissions proposed by the EEC cannot, in any case, be met through lean burn alone, particularly for larger cars. A three way catalyst will be required for larger vehicles (over 2 litres), lean burn plus oxidation catalyst will probably suffice for medium sized cars (1.4-2.0 litre) but in the small car class (less than 1.4 litre), which represents some 50% of cars on British (and 60% on EEC) roads the position is more complicated(32). Here the regulations appear to have been made deliberately loose so as to preclude the requirement of the catalyst route to air quality improvement (see Appendix 1).

Most simple oxidation catalysts cost about £50 (1986 prices)(33). A three way catalyst requires additional equipment to operate efficiently such as oxygen sensors and fuel injection systems. Catalyst fitted cars to meet European emission standards are priced on average some £275 (1987 prices) more than equivalent non-catalyst cars in West Germany (see Appendix 2). To meet US standards the price difference is £475(34). Catalytic converters have been shown to be very reliable and durable in extensive test programmes. A 1983 Volkswagen Scirocco fitted with a Johnson Matthey three way catalyst was driven under test conditions for 50,000 miles at an average speed of 105 mph. At the end of the test the car's exhaust emissions still conformed to the most stringent Californian standards, the current US standard and were well within the EEC standard(35).

Engine performance is of crucial importance to the motorist. An extensive test programme on a range of 22 European cars fitted with catalysts has demonstrated that there is little if any difference between catalyst fitted and non-catalyst fitted cars in terms of engine performance. Results from the tests showed that, on average, catalyst equipped cars consumed 1% more fuel and suffered a slight loss in performance when compared to non-catalyst fitted, fuel injected vehicles (see Appendix 2)(36).

Currently, UK motor manufacturers have to supply vehicles fitted with catalysts for export to the USA, Japan and other nations requiring strict vehicle emission standards. Europe is moving towards higher standards for vehicle emissions which will require the use of catalysts on large and medium classes of vehicle. If the UK motor industry is not tooled up to manufacture catalyst equipped vehicles then its prospects are very limited. It will face contracting opportunities in the luxury car market, lose valuable export markets within the post 1992 single market of the EEC and face increased import penetration from Japanese manufacturers already tooled up for catalyst production. West German motor manufacturers, particularly Volkswagen, are responding positively to the new market opportunities and look set to expand their market share.

A recent survey by Greenpeace(37) of leading motor manufacturers indicated that only Toyota and Volkswagen have catalyst equipped vehicles for sale in the UK. The models include Celica, Golf, Jetta and Passat. Rover, Saab, BMW, Mitsubishi, Vauxhall and Honda intend to introduce such vehicles in the future but they are likely to be luxury cars which the manufacturers already produce for sale in the USA, the world's largest luxury car market. Such cars represent only 8% of the UK car fleet.

Ford, Mercedes-Benz, Peugeot-Talbot and Citroen appear to be most opposed to catalyst control, Ford because they are tooling up for lean burn engines which are not capable of meeting the US regulations, and the French companies as their products appear unable to meet US standards without expensive redesign and engineering work.

Conclusions

It is illogical for the EEC to adopt standards for vehicle emission significantly weaker then their industrial competitors. Most other industrial nations have, or will, adopt US standards. By not doing so the EEC car makers are forced to produce engines for sale to different requirements and thus lose economies of scale whereas their competitors with a home market, already demanding the toughest standards, can benefit from a single production need. US standards can only be met by the use of catalytic converters, these are efficient at meeting emission standards under all driving conditions (high speed/load, low speed), without impairment of fuel economy or loss of performance. They are durable, reliable and commercially available.

Environmental and health considerations dictate that catalysts should be quickly adopted in the EEC as the technology to control vehicle emissions. Without a unified market for catalysts, air quality will continue to deteriorate as the car population increases. Tax incentives, in line with those introduced by the West German and Dutch governments to encourage clean cars meeting US standards, are required in the UK and the EEC as a whole. Without a positive government lead in motor vehicle emissions control the UK will lose a technological advantage in catalysts and will find its motor vehicle manufacturers losing out to other manufacturers who already make catalytic converter equipped vehicles for their home markets.

Appendix 1

Proposed EEC Emission Standards for Vehicles

Vehicle class	Implementation		CO	HC + NOx	NOx	% UK car fleet
	new models	new cars				
⩾ 2 litres	1/10/88	1/10/89	25	6.5	3.5	8
1.4-2 litres	1/10/91	1/10/93	30	8	—	42
⩽ 1.4 litres						
Stage 1	1/10/90	1/10/91	45	15	6	50
Stage 2	1/10/92	1/10/93	30	8		
Current EEC Permissive Directive			67	20.5	—	
US Equivalent			16	4.6	2.4	

All figures for CO, HC + NOx and NOx in grams emitted per test.

Appendix 2

Comparison of Catalyst and non-Catalyst Equipped Vehicles (1987)

Size	Maximum Speed mph	Acceleration 0-62mph, seconds	Fuel Economy	Price US	Price EEC Standard
⩾ 2 litres	-1.9	+0.3	-0.7	£478	N/A
1.4-2 litres	-2.0	+0.5	-0.7	£471	£307
⩽ 1.4 litres	+0.1	+0.3	-1.5	£502	£220
Average	-1.7	+0.4	-0.8	£474	£278

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THE POTENTIAL FOR ELECTRICITY FROM RENEWABLE ENERGY SOURCES

by
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1. Introduction

The concept that the so called renewable energy sources can make a significant contribution to electricity supply usually evokes mixed reactions. By some they are seen as a cheap, non-polluting benign alternative, by others as hopelessly impractical and uneconomic. In this paper I intend to show that the reality lies somewhere between these two extremes and that by the middle of next century we could have as much as 18% of our electricity supply generated from the "renewables". By this I mean wind, wave, tidal, geothermal, solar and biofuel. With the exception of geothermal and tidal all these sources rely on solar radiation.

I shall concentrate in this paper on wind power which is probably the most promising renewable energy source for the UK but I shall first briefly review the other renewable sources.

2. Solar Power

We should note that the energy captured by the earth from the sun in a couple of months is greater than the world's total coal and oil reserves (1,2). Thus we have plenty of potential to meet our requirements but this potential is thinly spread over the surface area of the globe. Direct conversion of sunlight into electricity using photovoltaic cells is an order of magnitude too expensive to be used for power generation in the UK (3). Indeed the civil costs of separately mounting large solar arrays in the UK itself exceed the present-day-worth of the electricity which could be generated even if the solar cells themselves were provided free of charge. Remote installations and non-grid connected stand-alone units are being exploited however, for example, channel buoys, watches, calculators, toys and garden lighting.

3. Tidal Power

This technology was established 20 years ago in France by the construction of the 250MW tidal barrage at La Rance. The best sites in the world for tidal power are the Bay of Fundy in Canada and the Severn Estuary in England and Wales. A barrage on the Severn Estuary would use 192 turbines and yield a peak capacity of over 7000MW (5). Because of the variation in the head available due to the tidal rise and fall, the mean energy production from such a barrage would correspond to that from a nuclear or coal-fired plant with a capacity of just 1600MW. Since the lunar cycle does not correspond to the solar cycle and high tides are not always available when the demand for electricity is at a peak we find that the "firm" capacity would be only about 1100MW. Generation costs from the Severn would be nearly 4p/kWh which is almost double the generation costs from the proposed nuclear power station at Hinkley Point at 2.2p/kWh (6). With an initial cost of over £5000 million the scheme is therefore unlikely to proceed without substantial Government subsidy. Other estuaries such as the Mersey have similar economics, but have significantly smaller potential.

4. Wave Power

Wave energy varies between a few kilowatts per metre of wave front to megawatts per metre in stormy conditions. Wave energy collectors have to be sensitive enough to move in resonance with normal sea conditions and yet robust enough to withstand North Sea storms. Despite the large resource potential of some 45TWhpa, i.e. about 20% of CEGB output, no large scale wave energy device has been studied in detail which could yield electricity at less than about 8p/kWh (7).

Small scale devices mounted at the bottom of cliffs in deep water with a small tidal range are significantly cheaper but the resource potential is much less.

5. Geothermal

There are over 5000MW of geothermal electrical generating plant worldwide (8) and in volcanic regions this is usually a very economic source of electricity. Countries such as New Zealand, Italy, California have all established geothermal industries.

In the UK, geothermal aquifiers are relatively cool — only about 70 to 80 C — so the alternative "hot dry rock" process is the only feasible source of geothermal generation. In certain areas, such as Cornwall, there is a higher than average temperature gradient, with temperatures of 180 C — 200 C at 6km depth. The heat can in principle be harvested by drilling a borehole, cracking the rock, intersecting the crack matrix with a second borehole and circulating water. The overall efficiency of electricity generation would be only about 5% and so large quantities of heat would have to be rejected. In addition there are potential environmental issues with radon emission. This technology is at the embryonic stage (only a 2km deep reservoir has so far been explored) but a resource potential of 10TWhpa could be exploited next century if the technology can be developed (9). The Government has announced a further £8M grant for the work at Rosemanowes Quarry in Cornwall. The technology may be extended to rocks other than granite, if the programme is successful and drilling technology makes deeper boreholes economically possible.

6. Biofuels and Waste

Biofuels are those which are directly derived from biological sources, often termed "biomass". There are two potential sources: organic waste including refuse, industrial wastes, forestry residues, straw and animal manures and energy crops grown specifically for energy production. Wastes also contain combustible material such as plastics which contribute to noxious emissions. The Department of Energy estimates that between 4 and 15 Mt coal equivalent per year of biofuels could be economically exploited in the UK. Some of this would be used for heat production, some for electricity production and some for combined heat and power systems.

Biofuels are little exploited in the UK at present and most refuse is disposed of in landfill sites. Such sites produce methane which can be hazardous. Thus in extracting methane for safety reasons, the opportunity arises to burn it and utilise its energy. Currently 19 landfill sites in the UK extract methane commercially, about a third of these generate electricity the others use the gas for heating.

In the future refuse combustion for electricity generation may be more exploited as landfill sites near to metropolitan centres become exhausted. Combustion temperatures tend to be lower and hence particular attention will have to be paid to limiting noxious, gaseous emissions from such sites. Currently there are four refuse incineration plants with energy recovery in this country.

7. Wind Power

7.1 Experience Worldwide

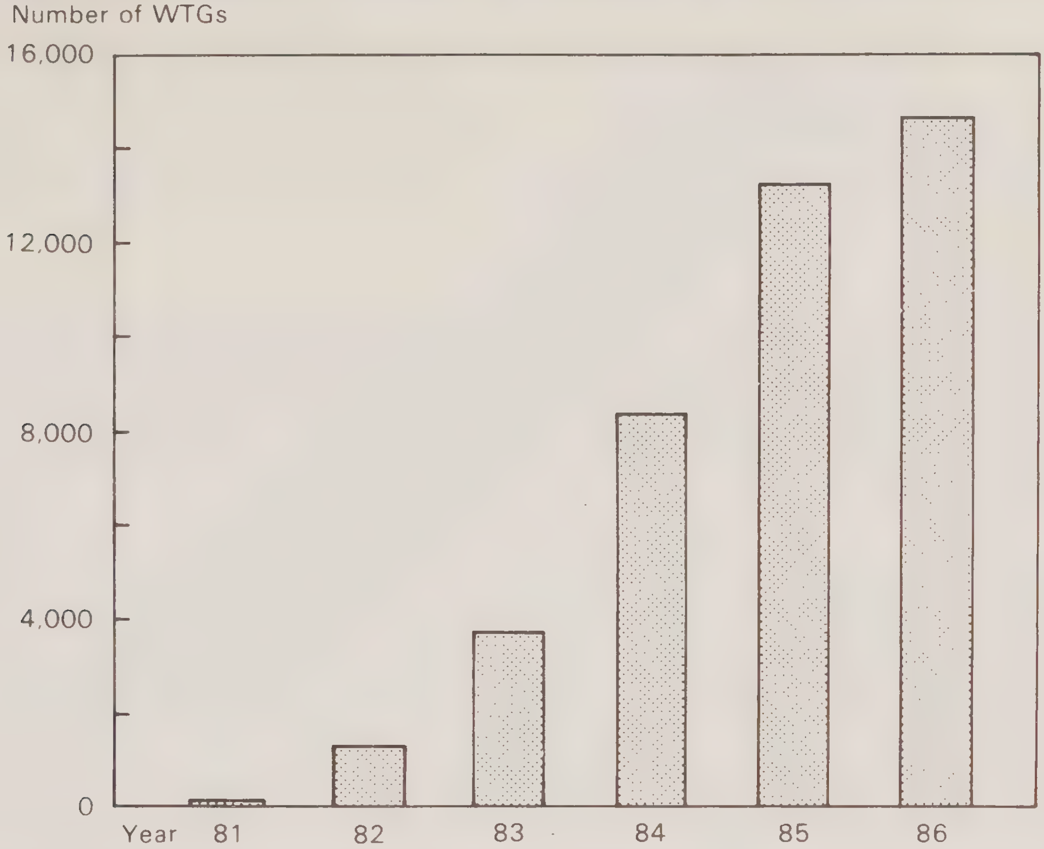
Rapid progress has been made in the deployment of wind turbines in the USA during the last decade (cf Figure 1). Currently 15000 machines are installed there. Some of these machines were "cowboy" installations and have not been successful. However, later designs have worked well and we are now receiving encouraging reports from the utilities and the Electric Power Research Institute which show availabilities exceeding 95% (10). The Wind Energy Group of the UK, has reported particularly encouraging results from the first year's operation of its Californian wind farm in the Altamont Pass.

About 1400MW wind turbine capacity is now installed in California, mainly in the Altamont Pass. This means that about 1% of Californian energy demands are now met from the wind. It should be noted that the wind blows most strongly in the Altamont in the afternoon in the summer which corresponds to the peak demand on the system from the air conditioning load in the cities.

7.2 Cost Experience

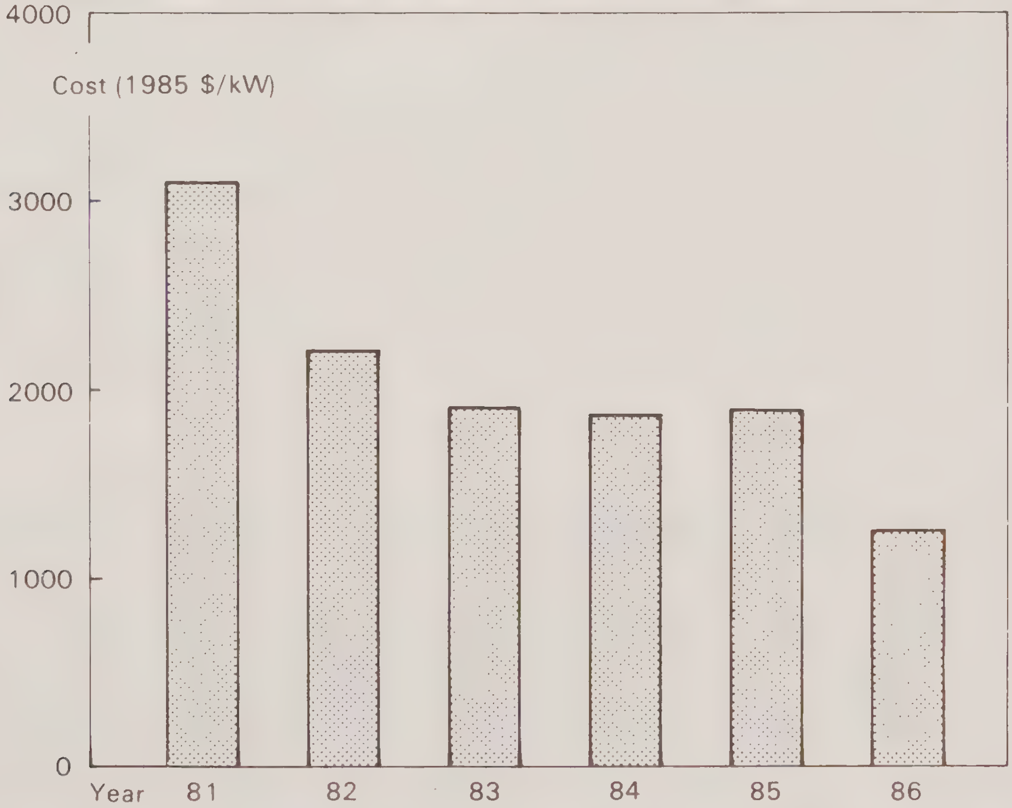
In parallel with the rapid expansion of wind farms, costs have fallen significantly — by a factor of about two during this decade (11) (cf Figure 2). With the terms currently offered by US utilities, entrepreneurs can pay back their investment within 5-10 years.

Fig. 1. Cumulative Number of Installed WTGs (California)



(From Status of US Wind Power Industry, October 1987 by Robert Lynette, International Conference on Windfarms, Leeuwarden, Netherlands)

Fig. 2. Average Installed Capacity Cost (California)



(From Status of US Wind Power Industry, October 1987 by Robert Lynette, International Conference on Windfarms, Leeuwarden, Netherlands)

At the price levels now prevailing in the USA (about $1500 per kW, i.e., about £800 per kW installed) wind power could be economic on windy sites in the UK provided that machines continue to have a high availability over their design life of 25 years. The greatest uncertainty is over lifetime maintenance costs, because large wind turbines have not been in operation for more than four or five years anywhere and we do not know whether high maintenance charges, for instance for machine reblading, will materialise in later years.

7.3 Cost Projection

Wind power economics are critically dependent upon mean wind speed. The energy which can be extracted increases as the cube of the wind speed. Thus the commercial viability of wind power depends upon being able to find large numbers of windy sites. These tend to be on windswept hillsides which are often cherished for their scenic beauty.

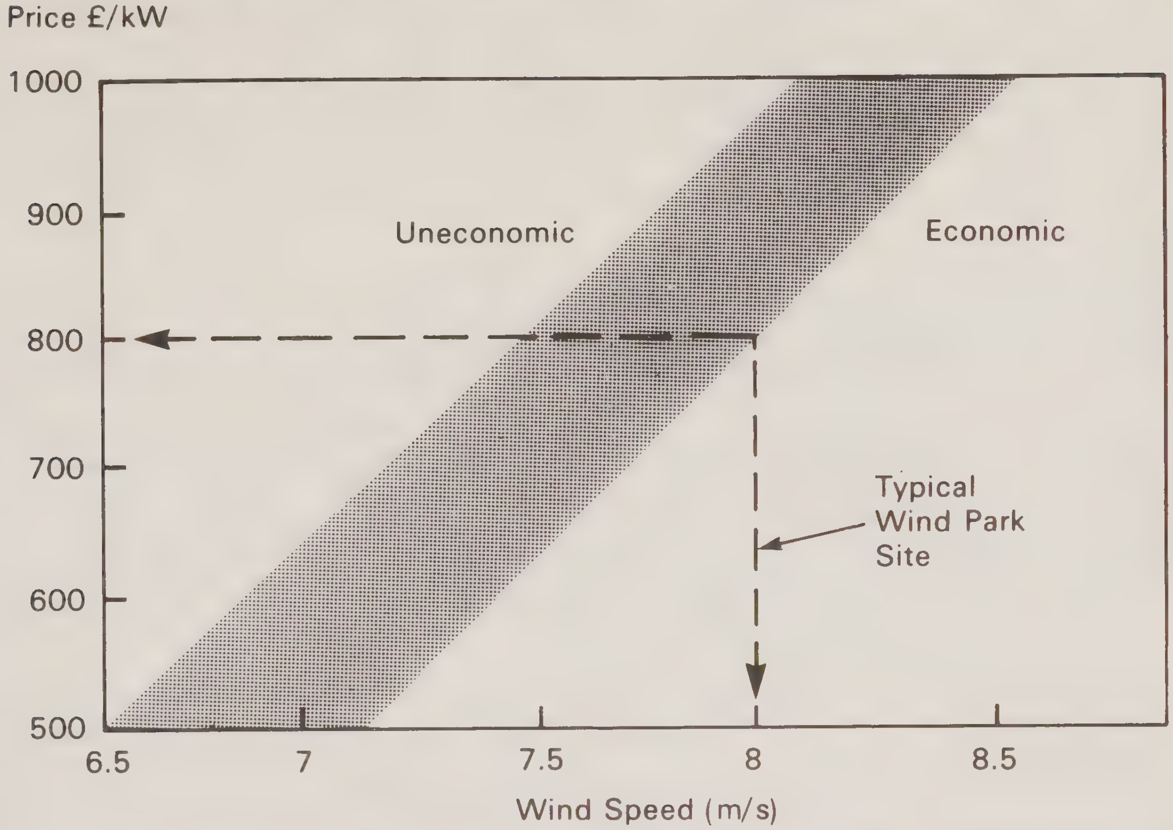
The wind does not blow all the time even in windy areas. The "load factor" for a wind turbine is the ratio of the actual energy produced to that which would be produced if the generator operated at full output, 24 hours a day, 365 days a year. For a typical wind turbine, the load factor is about 42% at 9m/s windspeed but falls to 20% at a windspeed of 7m/s. So for a 100% reliable machine having a nominal capacity of 1000kW, we will have an equivalent capacity of 420kW at 9m/s but only 200 kW, at 7m/s. This highlights the fact that the price we can afford to pay for a machine falls off rapidly at lower windspeeds. We estimate that the load factor for our wind parks will be between 30 and 40%.

In order to assess the economics of wind power we need to estimate how much electricity will be produced from the wind in terms of windspeed and machine availability and then make an allowance for the operation and maintenance costs of the wind turbines. We must then assess how much fossil fuel will be saved by this wind generation over the next 25 years. If we bring these savings to present day worth at 5% discount rate then Figure 3 shows the capital costs at which wind power would just break-even. For example, for a windspeed of 8m/s, £800/kW installed should just be economic at a 5% TDR. We suspect that our wind parks will cost about £1000/kW installed so we do not expect them to be economic even if they work perfectly. So manufacturers must aim at lower capital costs especially if we are required to achieve higher rates of return on capital investment.

7.4 Land Requirement

The Board has carried out preliminary studies on the distribution of average windspeed over the windiest areas. In general terms one could expect to achieve 4MW of wind power capacity per sq km, about 10MW per sq mile. We estimate there are about 2800 sq miles of land with windspeeds above 8m/s, which would give an installed nameplate capacity of 28GW if every square mile were planted with wind turbines. This would be equivalent to about 13GW of nuclear plant. For windspeeds between 8m/s and 7.7m/s there are a further 1800 sq miles of land (4500 sq km). Fully planted this could yield a further 18GW of wind power which would be equivalent to about 7GW of nuclear plant.

Fig. 3. Wind Power Break Even Capital Costs



It is a fact of life that high windspeed tends to go with mountainous areas and scenic beauty. The best resource lies in some of the most beautiful countryside, national parks, etc. Clearly nothing like all of this land could be dedicated to wind power. How much land could actually be made available depends largely on public opinion. One of the main reasons for our present programme is to establish just this. If only 10% of these windy areas were made available, then 2000MW equivalent plant capacity could be supported. Most of this could compete economically with coal-fired power stations but perhaps only 300MW-400MW would be cheaper than Hinkley Point C nuclear power station.

7.5 CEGB/D. Energy Programme

The programme announced by Lord Marshall in March 1988 contained the following elements:-

The Board has formally designated a site at Carmarthen Bay as its Wind Energy Demonstration Centre. With the opening of the Visitors Centre there later this year we expect that it will become a focus of much interest for wind power. The site will be used to test candidate machines for the three wind parks.

At the same time the processes will be put in hand for the planning consents and acquisition of the three sites so that we will be in a position to erect machines on the first site in about 1990. The other two sites will be developed in 1991 and 1992 and, if all goes well, commercial extensions of these or other sites could be a reality by 1995.

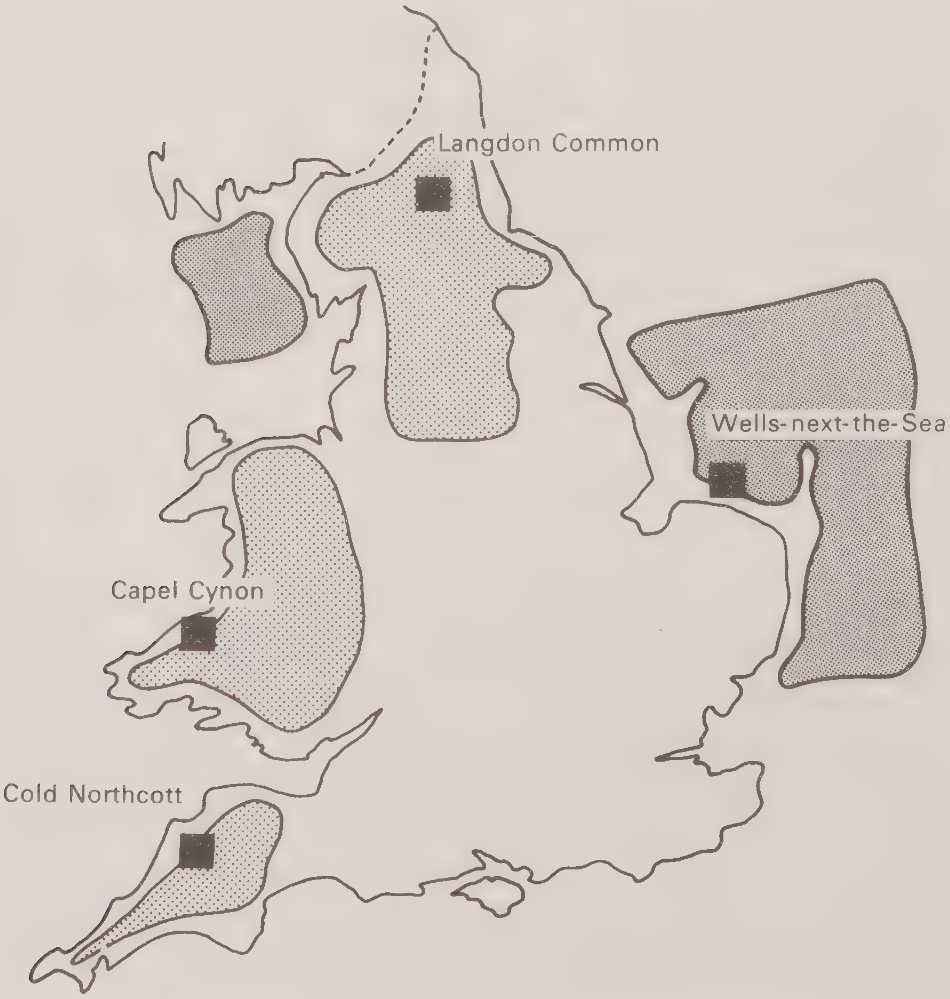
Wind Energy Group (WEG) is developing a 2-bladed 300kW machine which it is proposing as the successor to its 3-bladed 200 kW machine which has been successfully deployed in California. We hope that the first of these machines will be installed at Carmarthen Bay so that we can have first hand experience of it before deciding whether to deploy it in one of our demonstration wind parks.

Another option for the wind parks would be the vertical axis wind turbine, a pilot version of which has been installed at Carmarthen Bay since 1986. We are currently discussing with VAWT Limited whether we should host a 500kW version of this machine at Carmarthen Bay.

When searching for commercial wind power sites we need to look to the western extremities of the country and to high ground. Naturally we have to exclude cherished landscapes, conurbations, communications links, airfields and other protected land. The three shaded areas in Figure 4 seem to be the most promising. In order to establish the viability of wind farming we are therefore planning to build a demonstration wind park in each of these areas:-

Cold Northcott near Launceston in Cornwall
Capel Cynon near Carmarthen in Wales
Langdon Common, south of Durham

Fig. 4. Location of High Winds



The Langdon Common site may be contentious because it involves land recently designated as an Area of Outstanding Natural Beauty and also the fringe of a Site of Special Scientific Interest. However, the potential for wind farming in the Northern Pennines is large and if it could be established that this was an acceptable way of farming the wind in a rural, depressed area then as much as 1000MW of wind power could be accommodated.

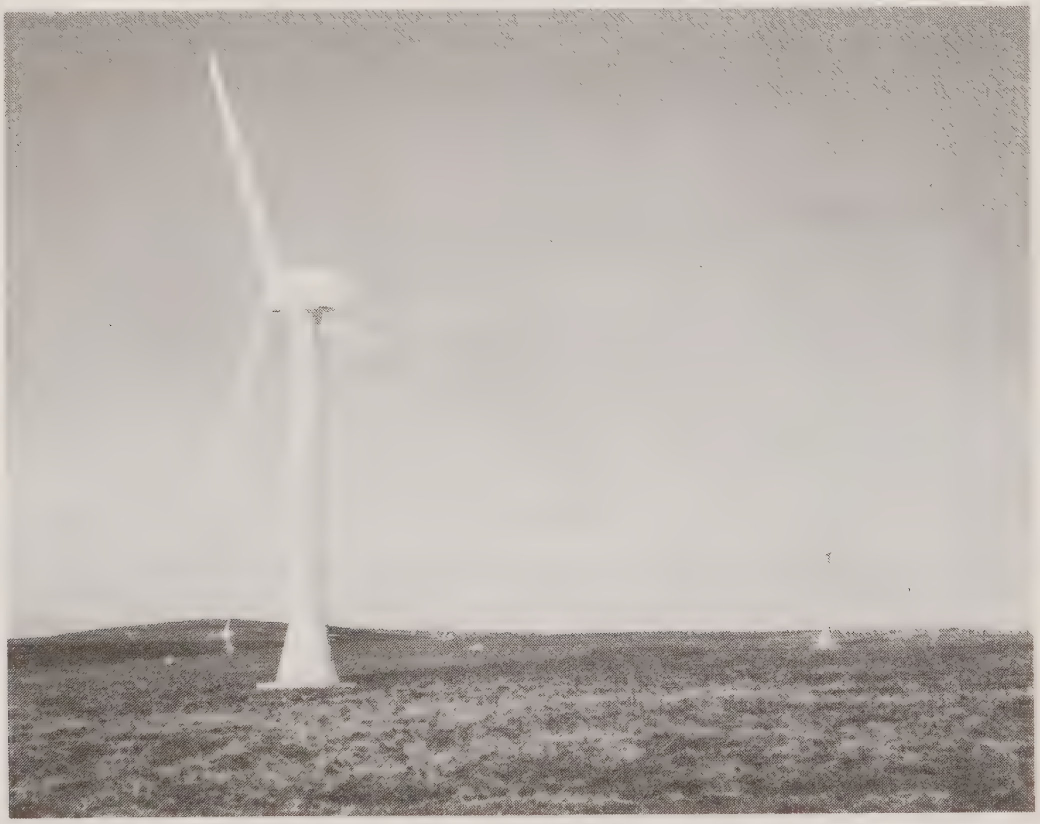
7.6 Visual Impact of Wind Parks

Early developments in the USA were carried out by speculators and frankly many of them looked messy! More recent developments however have been more carefully carried out and the Howden wind farm in California now fits much better into the landscape.

In hilly country, wind turbines would not be sited in straight rows, but machine spacing would be varied to suit the topography. Figure 5 shows an artist's impression of what one of the Board's demonstration wind farms would look like. This is the impression of the Langdon Common site; the wind turbines integrate well into the moorland landscape with minimal visual intrusion.

A recent small scale public opinion survey carried out for the Board established some interesting preliminary conclusions about public attitudes to wind power. Most important, only about 12% of people have ever seen a modern wind turbine.

Fig. 5. Proposed Langdon Common Wind Park



An artist's impression of the proposed wind park at Langdon Common, County Durham jointly funded by the CEGB and the Department of Energy. The development of 25 horizontal or vertical axis wind turbines, each of 300-500 kilowatts, would occupy an area of three to four square kilometers. The impression shows horizontal axis machines in a possible layout which would be determined from the site investigations.

This underlines the need to demonstrate wind power to the public. People seem to like the slim, elegant high technology designs now available. These conclusions will be tested by our programme.

Public opinion surveys will be mounted around the three wind power sites before, during and after construction. Each wind park will contain a Visitor centre and this will be used both to explain the plans to the public and also as a further method of eliciting their views.

7.7 Offshore Wind Power

The largest potential renewable energy resource in Great Britain is offshore wind power, which could in theory provide over 200TWh of electricity per annum (12). This is comparable to the electricity demand in England and Wales. In practice only 10-20% of this could easily be integrated into the CEGB system because of technical problems associated with the intermittent nature of the wind (13).

To date, thinking has been that offshore wind energy will be too expensive to be a contender. However, a reappraisal by the Board has suggested that medium sized wind turbines erected in shallow water on steel structures may have economic potential. Support has therefore been secured from the European Commission, the Department of Energy, the Eastern Electricity Board and James Howden and Company to build the world's first truly offshore wind turbine. This will be a 750kW production wind turbine standing on a steel tripod some 5km off Wells-Next-the-Sea in North Norfolk. This will help to establish the true operation and maintenance costs of offshore wind turbines and if these can be contained then we may see offshore wind parks becoming a commercial reality towards the end of the 1990's.

7.8 Possible Wind Power Capacity by 2005

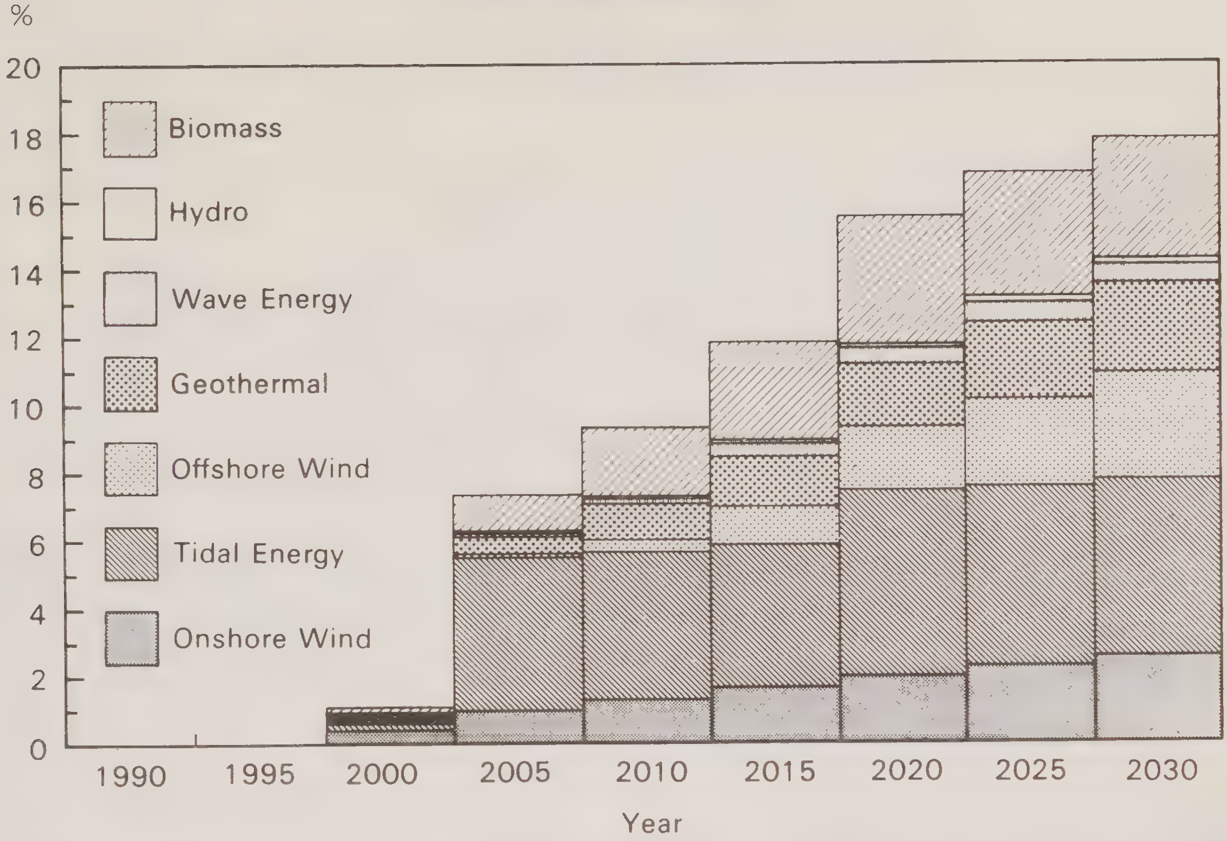
If things go well and if economic and social criteria are met then this programme should pave the way for 1000MW of wind power in the UK by the year 2005. This will meet about 1% of the nation's electricity requirements. Although this does not sound a lot, we must remember that it corresponds to power for half a million people and an alternative to burning nearly one million tonnes of coal each year. That must be good for the environment in the long term.

But achievement of this target depends on the crucial factors mentioned above: reliability, maintenance costs, capital costs — most of all on public acceptability.

Conclusions

Overall, if all the technologies mentioned reach technical maturity and become both economic and socially acceptable then it is possible that up to 18% of electricity might come from the renewables by 2030 (14). This projection is shown in Figure 6. Renewables certainly have an important part to play in satisfying the energy needs of this country and are already competitive at the margin. But it would be unrealistic to expect that they could supply the major part of the energy needs of a society such as we all live in. These will still have to be provided by fossil and nuclear energy.

Fig. 6. Upper Limit of Renewable Energy Contributions as % of Likely UK Electricity Demand



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8th WORLD CLEAN AIR CONGRESS AND EXHIBITION

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THE HAGUE, NETHERLANDS

Programme includes lecture and poster sessions covering all aspects of air pollution control; technical excursions; exhibition; social events.

Details:
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UPDATE

ENVIRONMENTAL POLLUTION 1987

The Department of Environment's latest statistical data published at the end of February show that pollution from many sources is still worryingly high. Some of the main points.

Sulphur Dioxide and Smoke

Total UK sulphur dioxide emissions in 1987 were estimated to be 3.87m tonnes, which is comparable to 1986. Power stations were responsible for approximately 73% of the total (an increase of approx. 3% over 1986).

The Large Combustion Plant Directive which was agreed in June 1988 requires the UK to reduce SO_2 emissions from existing installations by 20% by 1993, using 1980 figures as a base. In 1987 emissions from large plant were 3.30m tonnes, which is 85% of the 1980 emissions figure of 3.89m tonnes.

There was a reduction of 0.04m tonnes in UK smoke emissions from coal combustion to 0.23m tonnes, a fall of over 85% since 1960. There are now more than 6,000 smoke control orders in the UK covering over 900,000 hectares, and about two-thirds of urban properties. Average urban smoke concentrations fell by 38% in the last decade.

Acid Deposition

In common with the 1986 results from the DoE's two monitoring networks, in 1987 rainfall acidity was highest in Yorkshire and Humberside, and lowest in North West Scotland, Northern Ireland, West Wales and South West England. Wet acid deposition is highest in areas of high rainfall, eg parts of Scotland, North Wales and Cumbria, where levels are comparable with those in acid rain damaged areas of Southern Norway.

Following concern that nitrogen deposition may be a factor in forest decline in Europe, and may contribute to acidification of soils and surface waters, the DoE published a report in 1988 *Nitrogen Deposition and its Impact on the Environment.* The report says that there is sufficient evidence to associate nitrogen deposition with acidification of soils and surface water but that more research needs to be done on the overall effect of nitrogen deposition on the environment.

Nitrogen Oxides, Carbon Monoxide, Carbon Dioxide, Hydrocarbons

Emissions data for carbon dioxide have been included in the *Digest* for the first time thus reflecting recognition of their importance as a greenhouse gas. Power stations were responsible for 37% (233m tonnes) of the total man-made emissions figure of 627m tonnes. CO_2 emissions are still increasing from 601m tonnes in 1985 to 621m tonnes in 1986.

Carbon monoxide emissions also increased from 5.08m tonnes in 1986 to 5.26m tonnes in 1987; this is an increase of 10% in the ten years to 1987 and is due to increases in road transport emissions. Emissions of nitrogen oxides rose for the fourth consecutive year to 2.30m tonnes in 1987 (2.21m tonnes in 1986). Total Hydrocarbon emissions were also up on 1986 at 2.35m tonnes; road transport was responsible for 28% of the total and industrial processes and solvent evaporation for 46%.

Lead

Emissions of lead from petrol engined vehicles rose slightly in 1987 to 3,000 tonnes, in line with rising petrol use. Although nearly two-thirds of cars on the roads are potentially capable of using unleaded petrol, by November 1988, it still accounted for less than three per cent of total deliveries.

Water Pollution

Between 1986-87 there was an increase of nearly nine per cent in reported water pollution incidents in England and Wales. Of the total of 23,253, 37% were indentified as being attributable to industry, 20% to problems with sewage and sewerage and 19% to farm pollution.

Noise

Complaints about noise from domestic premises have increased by a factor of seven over the ten years to 1986/87; Environmental Health Officers received a total of 46,803 complaints under Section 58, Control of Pollution Act 1974, Part III. 46.6% of sources were considered a nuisance and abatement notices were issued for 6%. Amplified music and barking dogs accounted for two-thirds of the complaints.

In October 1986 fixed penalties for alleged noise offences from motor vehicles were introduced; the total number of alleged or actual offences dealt with by conviction, written warnings and fixed penalties in 1986 was 11,422; in 1987 this fell to 8,816. It is also estimated that over 10,000 notices were issued for faulty silencers.

Waste

The amount of waste classified as hazardous is estimated to have been about 3.7m tonnes in England and Wales in 1986. In 1986/87 some 83% of this was disposed of to landfill and a further 8% by dumping at sea. Toxic waste imports for treatment more than doubled in a year to 53,000 tonnes in 1986/87.

UNIVERSITY OF ESSEX

AIR POLLUTION

ATMOSPHERIC PROCESSES, MONITORING INSTRUMENTS & STRATEGIES

An intensive short course, October 2-5, 1989
Details from: Dr. Roy M. Harrison, Institute of Aerosol Science,
University of Essex, Colchester CO4 3SQ.

Reader Enquiry Service No 8904

AIR POLLUTION REGULATIONS

The Department of Environment has issued three sets of Regulations as a first stage in implementing the proposals set out in the December 1986 Consultation Paper *Air Pollution Control in Great Britain.*

The Health and Safety (Emissions into the Atmosphere) (Amendment) Regulations 1989 add a small number of works to those currently scheduled under the 1983 Regulations for HMIP control. There are some detailed amendments to the asbestos works definition in the 1983 schedule, necessitated by the EC Asbestos Directive and a number of detailed changes to the definitions, such as specifying thermal input for combustion works, in line with the EC Large Combustion Plants Directive and DOE's decision to add styrene and fumes or dust containing thallium to the list of noxious or offensive substances because of their known toxicity.

The Control of Industrial Air Pollution (Registration of Works) Regulations 1989 are intended primarily to provide for greater public access and involvement in applications to HMIP for registration of scheduled works. Because the procedures involve some input from local authorities, by way of holding a duplicate register of applications and registrations, a circular will accompany the Regulations. A short leaflet explaining the scope for public involvement in the registration process and the issues on which representations can be made, is also being prepared.

Under the new procedures, there will no longer be an annual registration requirement. This means that, as long as the Regulations are in force by 31 March 1989, existing registered works will not have to re-apply for registration this year. HMIP are in the process of notifying registered works of this.

The Air Quality Standards Regulations 1989 give statutory force to air quality limit values set in three EC Directives (on sulphur dioxide and suspended particulates, lead in air and nitrogen dioxide), require monitoring of air quality and place a duty on the Secretary of State to take any necessary remedial measures to ensure that the limit values are not breached.

TOXIC WASTE REPORT

The House of Commons Select Committee on the Environment has severely criticised the Government's record on toxic waste disposal*. The all-party Committee chaired by Sir Hugh Rossi MP said that some sites were "appalling and potential disaster areas"; they had found evidence of methane gas leakage close to housing and evidence of other toxic substances leaching into water supplies. The Committee singled out the Department of the Environment's failure to enforce the Control of Pollution Act 1974, legislation which it says needs tightening and loopholes closing. The report says that HMIP is grossly understaffed with until recently only six inspectors for more than 5000 sites (an extra nine posts were announced in December), and that local authorities have also seriously under-resourced waste management services.

The Committee recommends the creation of ten new regional waste regulation authorities to take over responsibility for the operation of waste disposal to be regulated by an independent national body. It also recommends that a national environmental protection commission should be set up; its remit should include overall responsibility for safeguarding the quality of air, soil and water.

Environment Secretary, Nicholas Ridley has said the Government will make a full response to the report. He said that the proposal for an independent environmental protection commission was far-reaching and needed detailed examination. He said it raised much wider constitutional issues including that of Ministerial accountability to Parliament.

**Toxic Waste, Second Report of the Environment Committee 1988-89. House of Commons Paper 22-1, HMSO, £10.50.*

CONTROL OF LANDFILL GAS

Waste Management Paper No. 27 from HM Inspectorate of Pollution in the series of technical memoranda on waste management matters deals with the measures required to monitor and control the production of gases from landfilled wastes. These gases, mainly methane and carbon dioxide, have given rise to dangerous accumulations in buildings and a number of explosions have occurred as a result of gas migrating from landfill sites, notably at Loscoe in Derbyshire in 1986.

Part 1 provides a summary , including key points for licensing officers of the technical aspects of the control of landfill gas. Part 2 discusses the main factors responsible for the formation of landfill gas and gives information on the options available for its management. A code of practice on management will be provided in the first revision of the paper, scheduled for 1990.

Available from her Majesty's Stationery Office. Price £6.80.

ENVIRONMENT AUDIT

A wide ranging environmental audit carried out by Friends of the Earth for Kirklees Council in West Yorkshire has attracted much interest. The audit was done in late 1988 and as well as looking at areas such as air and river quality, also assessed the effectiveness of the Council's environmental strategy, which is praised in the final report; also given credit is Kirklees' energy unit for work on energy conservation in buildings. The audit did, however, show up "disturbing" amounts of the pesticides dieldrin and lindane in some parts of the river; agricultural run-offs, industrial discharges and discharges of pollution from sewage treatment plants were also of particular concern. Very high levels of acid precipitation were also found in the area — some as high as amounts recorded in Southern Sweden and West Germany. The report also suggests areas where Kirklees could do better; for instance, regular monitoring of traditional air pollutants, checks on waste incineration and monitoring of waste sites; also monitoring of noise and energy conservation information for private householders is suggested.

GLOBAL AIR MONITORING

According to a report shortly to be published under the WHO/UNEP Global Environment Monitoring System (GEMS), two thirds of the world's 1.8 billion city dwellers are exposed to air with worryingly high levels of sulphur dioxide and dust.

The report which was approved in September by Government-selected health and environmental experts from 12 industrialised and developing countries reports the results of monitoring carried out in 60 countries during the last 10-15 years.

As well as SO_2 and dust, information on nitrogen dioxide, carbon monoxide and lead was also collected, and comparisons made with the WHO air quality guidelines. So far as SO_2 levels to 1984 are concerned, cities such as Chicago, Bangkok, Tel Aviv and Melbourne all registered low levels; among cities registering the highest levels were Beijing, Paris, Sao Paulo, Calcutta, New York and London. While SO_2 levels in many developing countries are unacceptable, for smoke and dust the situation is even worse: the report estimates that about 1.25 billion people live in unacceptable conditions and a further 200 million have only marginal conditions.

These results are taken from *Sentinel,* published by the Monitoring and Assessment Research Centre for UNEP/ILO/WHO International Programme on Chemical Safety. Other sections of the GEMS report deal with the quality of water and of food. The address of MARC is The Old Coach House, Campden Hill, London, W8 7AD.

WARMER WEATHER

Figures published by the Meteorological Office recently show that 1988 was the world's warmest since reliable records began some 100 years ago. Global average temperatures were 0.34°C warmer than the long-term average for a 30 year period to 1979. However, although the warmest years since 1900 have all been in the 1980s, Dr. Phil Jones of East Anglia's Climatic Research Unit says that it is too early to say that this is due to the greenhouse effect; "if the high average temperatures continue through the 1990s", says Dr. Jones , "there will come a point when we can be certain its happening".

The unseasonally warm weather in Europe this winter has resulted in alarming levels of air pollution and urgent calls to limit traffic in many cities. In Paris, in early February, the level of pollutants mainly from motor car exhausts reached 143 micrograms per cubic metre. Geneva was enveloped in smog for much of January and in the first week of February the amount of nitrogen dioxide in the air rose to 140 micrograms per cubic metre — nearly double the figure of 80 micrograms per cubic metre that they would expect to surpass once a year. In Milan, the Mayor ordered that the 9,000 lorries a day that normally enter Milan to go through customs should be processed outside the city. The state government has also allocated £6m to buy electric buses and to convert diesel buses to methane gas fuel. Madrid was also covered in a black cloud during January. In London, levels of 19-25mg per cubic metre of carbon monoxide were recorded fifteen times between October and the end of January.

SAVING THE OZONE LAYER

More than 120 countries — industrialised and developing — were represented at the UK Government's International Conference on Saving the Ozone Layer held 5-7 March in London. The Conference which was co-sponsored by the UN Development Programme aimed to extend understanding of ozone depletion, to encourage the development of CFC replacements and to highlight the importance of co-ordinated international action.

At the start of the conference, which brought together politicians and scientists working on the ozone issue, only 33 governments had ratified the Montreal Protocol. By the end of the conference a further 20 including Brazil had committed themselves to signing and the same number had promised to give the matter serious consideration. China (see below: CFCs and China) and India indicated that they too might reconsider their position if aid and technology were made available to developing countries to help them develop substitutes. The Declaration from the Conference will be submitted to the May meeting of the UN Environment Programme in Helsinki called to strengthen the Protocol. The Declaration states:

- There is clear evidence of the growing concern of governments from every region of the world about the urgent need for effective action to safe-guard the ozone layer.
- The ultimate goal has to be the total elimination of production and consumption of CFCs and halons.
- Action to protect the ozone layer will at the same time reduce the impact of global warming, which poses serious threats to certain low-lying developing countries.
- Industry should be asked to concentrate even greater efforts on providing solutions and promoting them worldwide.
- Essential information should be more widely propagated because an informed citizenry is essential to the solution of severe global problems.
- The work of expert panels on scientific, technical, economic and environmental aspects would be of crucial importance.
- Ways of helping developing countries should be a major feature of the protocol review and urgently examined in all appropriate international contexts.
- Technical solutions are needed to help to solve Third World human problems.
- The review of the protocol should ensure that stringent provisions are applied even-handedly.
- All countries of the world must commit themselves to concerted action to achieve the goal of saving the ozone layer.

CFCs AND CHINA

The Chinese authorities have announced plans to increase production of chlorofluorocarbons by 10 times by the year 2000. This would bring production of CFC 11 and CFC 12 up to 0.05 kilograms per person per year by the end of this century. Under the terms of the Montreal Protocol, which China has not signed, developing countries are limited to 0.3 kilograms per person; however it is widely recognised that should all developing countries — the UN gives 132 countries this status — produce CFCs up to this quantity, the efforts of the rest of the world to halt the damage to the ozone layer would be completely negated.

Part of the reason behind China increasing production could well be the Chinese consumers' newly acquired ability to be able to purchase consumer goods — during the early 1980's the percentage of Beijing households with refrigerators rose from around 3% to more than 60%.

"OZONE FRIENDLY" FRIDGE NEWS

With effect from 28th March, a 50% reduction has been made in CFCs used in all the basic model refrigerators produced at Electrolux's Co. Durham plant. CFCs are used in the rigid polyurethane foam which insulates fridge walls. It is thought that it will be another five years at least before a fully ozone-friendly fridge will be available.

ARCTIC OZONE THREAT

Initial results from research carried out by an international team of scientists during the first six weeks of this year have shown that high concentrations of ozone-destroying chlorine compounds exist in the Arctic stratosphere. Two aircraft carrying a range of sampling equipment each flew 14 times during the mission, scanning in arcs from Greenland and Scandinavia to the North Pole. Key points from the NASA — led Arctic Airborne Stratospheric Experiment included:

- observed levels of ozone-depleting gas (chlorine monoxide radical) 50 times higher than previously predicted;
- a considerable proportion of the air over the polar region primed for ozone depletion during the winter.

The full results of the study are being prepared for scientific publication later this year and will also contribute to the scientific assessment of the Montreal Protocol which is being prepared.

CFC DISPOSAL

The rush by some companies to announce the removal of CFCs from refrigeration plants, has prompted the Heating and Ventilation Contractors' Association to point out the need for CFCs to be disposed of safely. In a report, *Safe Disposal of CFC refrigerants*, published in January they say that there is no way to destroy CFCs, and the safest place is where they are — sealed inside refrigerators. The HVCA estimates that the amount of CFC refrigerant at present "banked" in refrigeration systems in the UK is in excess of 30,000 tonnes, of which about one-tenth is in domestic refrigerators and freezers.

In its report the HVCA tells supermarket owners to avoid premature scrapping of systems which use CFCs 11 and 12 and to make safe disposal a condition of contract, as soon as facilities are available, and ensure the condition is complied with.

The HVCA report calls on the government to introduce a statutory requirement to dispose of CFCs safely once destruction facilities are available, and to set an example to commercial and industrial refrigeration users by taking responsibility for safe disposal of its own CFCs. HVCA want the Government to introduce tax reliefs, additional capital allowances or other fiscal concessions which will make investment in CFC recovery and destruction capacity financially viable.

VEHICLE POLLUTION

Four out of five of Britain's drivers regard air pollution from exhaust fumes (81%) and from lorries and buses (79%) as representing a serious threat to the environment. These were considered a more serious threat than air pollution from aerosols (71%), from factories (72%) and power stations (68%).

These findings emerge from a detailed MORI survey* into the behaviour, attitudes and lifestyle of over 1,500 of Britain's motorists carried out for Lex Service, a major retailer of cars, vans and trucks in the UK.

Questioned about their use of lead-free petrol, 5% of car drivers claimed to run their cars on it, while 9% claimed they didn't even though their cars were capable of using it. However, two-thirds of drivers (69%) would run their cars on lead-free petrol if they could. Of those that either use unleaded petrol or said they would if they could, 87% gave reducing pollution as the reason.

The majority of those questioned also believe that by the year 2001, all petrol engined vehicles will use unleaded petrol, cars will be banned from more town and city centres, and London's rush hour traffic will be reduced to a walking pace. Nine per cent of those questioned think that by 2001 cars will run on electricity and not petrol and seven % expect cars to be driven by computers needing no driver at all!

Based on current and expected car ownership, the Lex report predicts an extra 2.6 million cars on Britain's roads in two years time.

★ *Lex Report on Motoring, February 1989. 1576 drivers were interviewed by MORI in 175 constituency sampling points throughout Great Britain between 28 November and 12 December 1988.*

CLEANER WITH A CATALYST

A multi-million pound research programme, partially funded by the West German government and carried out by Volkswagen, has shown that lean burn engines cannot match the low pollution levels under all conditions produced by engines fitted with a three-way catalyst.

As part of the research programme, engines without catalysts, but which could meet tough US legislative standards were constructed. In the process it was discovered that lean burn engines in general not only suffer from a number of operational problems, but when used at speeds above 60 mph they produced nitric oxide emission levels higher than those of cars with three-way catalysts with Lambda control.

The research showed that it may be possible to meet the 1983 US Standard with a lean burn engine without a catalyst and that operational disadvantages of lean burn engines such as unsteady idle speed or misfiring can be avoided by incorporating several high-tech features, such as a sophisticated ignition and injection control, improved mixture preparation and an advanced engine cooling system. As a result however, the additional costs were far greater than those of a three-way catalyst equipped car.

Tests produced the same results for lean burn engines built to meet the Euro-norm standard where pollution levels are only measured up to 30 mph, a level easily matched by lean burn engines and catalyst alike. However, when the speed was increased beyond 30 mph, the lean burn engine produced more pollutants than the catalyst-equipped engine.

LARGE COMBUSTION PLANT

The official text of the EEC Directive on emissions from large combustion plant has now been published. The legislation, which was finally agreed after five years of negotiations, applies to combustion plant with a thermal input of 50MW or more, regardless of fuel used, except for units where the products of combustion are used in the manufacturing process.

The Directive obliges Member States to reduce emissions of sulphur dioxide and nitrogen oxides, and is seen by the EEC as a major step in acid rain abatement. Reduction targets vary between countries, but the overall effect of the Directive will be to reduce emissions of SO_2 from existing combustion plant from 14.43 million tonnes in 1980 to 6.14 million tonnes in 2003, a drop of 58%. NOx emissions will be reduced by 30% by 1998 (on 1980 figures), to 2.58 million tonnes. Member States have until 1 July 1990 to draw up their reduction programmes. From 1990 annual emission inventories for SO_2 and NOx will have to be drawn up and progress reports on implementation of the Directive will also have to be submitted to the Commission.

A second main part of the Directive sets SO_2 and NOx emission limits for new plant (ie those given a construction licence after 1 July 1987), although emission limits for new plant in the 50-100 MW range will be set in 1990. The Directive also lays down general procedures to be followed in cases of abatement equipment failure, monitoring procedures and how compliance with the limit values is to calculated.

It is not yet clear how the Government intends to apply the emission limits which will be necessary if the UK is to meet its reduction target.

RADIATION MONITORING

The Local Authorities Radiation and Radioactivity Monitoring, Advice and Collation Centre — LARRMACC — was launched in September 1988 with the support of the UK's five local authority associations.

LARRMACC has five main objectives:

- to advise individual or groups of local authorities on the monitoring of radiation and radioactivity;
- to assure the quality of monitoring data from la's to collate and interpret that data and to combine it to form a national database;
- to co-operate with appropriate Governmental and non-Governmental agencies in the establishment of mutually acceptable quality assurance criteria for monitoring procedures, sample analysis and assessment of results with a view to securing compatability;
- to co-operate and work with appropriate Government and non-Government agencies to provide input into, and receive access to databases maintained by the agencies; and
- to provide information and advice to la's on the results of routine monitoring and monitoring at a time of apparent nuclear emergency and to issue guidance as necessary.

Membership of LARRMACC is open to individual or groups of local authorities who will pay a subscription to join. LARRMACC's first publication *Radiation Monitoring — what is the Future* summarises the presentations given at the inaugural seminar organised by the Association of Metropolitan Authorities to launch LARRMACC. It is available from the AMA, 35 Great Smith Street, London SW1P 3BJ, price £4.95. A free leaflet about LARRMACC is also available from the AMA.

RADON ACTION NEEDED

A report published by the Institution of Environmental Health Officers in January has shown that the existence of radon is rather more widespread than had previously been thought. Radon is a radioactive odourless gas which occurs naturally in rocks such as granite, and can move readily through porous rock and soil and seep into buildings where dangerous concentrations can accumulate. It is thought to be the second most important cause of lung cancer after smoking and to be responsible for an estimated 2,500 deaths annually in the UK.

While attention has mainly focussed on Devon and Cornwall where many houses were built on ground containing uranium-bearing rock, the IEHO survey (involving 121 local authorities) has shown up other radon "hot spots". In particular, homes in parts of Cumbria, Staffordshire, Mid-Glamorgan and the West Midlands were shown to have disturbing levels of radon.

In its report the IEHO has called for national radon surveys to be expanded to include all areas of the UK within a rolling programme of regional appraisal, with Local Authority EHO's collaborating cost effectively with NRPB. It also wants the action level for existing homes to be reduced by 50 per cent to 10 mSv y^{-1} (200 Bq m^{-3}) and the investigation level to be 5 mSv y^{-1} (100 Bq m^{-3}); it recommends that the radon concentration justifying remedial action within one year — to be reduced from 50 mSv y^{-1} to 40 mSv y^{-1} (800 Bq m^{-3}).

Among the IEHO's other recommendations are that the mandatory House Renovation Grant provisions should be extended to include all dwellings with radon levels above the prevailing action level; local authority EHO's to be empowered to serve statutory notice on landlords to remedy tenanted dwellings found to be above the prevailing action level; and for a new system of Radon Certification of houses at the time of sale or resale to be introduced so that new owners have a statutory right to information in respect of radon testing and remedy.

Radon, report of the IEHO survey on Radon in Homes, available from the IEHO, Chadwick House, Rushworth Street, London SE1 0QT, price £6.00.

BIOTECHNOLOGY

According to a senior administrator at the Health and Safety Executive the Government is expected to introduce legislation later this year controlling the release of genetically engineered organisms into the environment. The HSE has issued a consultation document outlining the measures that might be included in any legislation; these include a duty on researchers to notify the HSE thirty days in advance of any planned experiments outside the laboratory; scientists would also have to undertake studies to assess the risks that would be involved in releasing a genetically engineered organism into the environment. At the moment researchers have only voluntary guidelines to follow when carrying out experiments with transgenic animals and plants outside the laboratory.

ACID DEPOSITION IN GREATER MANCHESTER

In 1983, the Department of the Environment UK Review Group on Acid Rain drew attention to the lack of data on acid deposition in urban areas. Partly in response to this the Acid Rain Information Centre survey was set up; survey results for the first full year of operations are now available.

Analysis shows that anthropogenic sulphate, an oxidation product of sulphur dioxide gas, is the predominant ion in rainfall over Greater Manchester, being found in greater quantities even than sea salts. Concentrations in rainfall samples are highest in the City Centre and Salford, and the north east of the conurbation. The yearly mean pH was 4.30, which is considered quite low given the amounts of buffering salts found in the urban atmosphere. The most "acid" seasons were summer and in particular, winter. There was significant spatial variation of hydrogen ions, the highest values (ie lowest pH values) being found at the periphery of the conurbation.

The survey results have identified a clear urban effect on acidic deposition, and the acidity of precipitation over Greater Manchester has been determined by this urban network. The ultimate aim of the research is to be able to give a reliable estimate of how much the pollution is locally derived and how much is from more distant sources. This will enable effective control strategies to be suggested for the urban area of Greater Manchester.

The survey is financed by the Association of Greater Manchester Authorities Joint Planning and Countryside Committee. (Source: Manchester Area Pollution Advisory Council — Air Pollution Monitoring 1988)

CARING FOR THE FUTURE

The Rt Hon Nicholas Ridley MP, and Labour MP, Jack Cunningham MP will both give keynote speeches at the Association of Metropolitan Authorities conference for the environment to be held 10-12 July. The conference has four main objectives.

- to identify and promote the acceptance and awareness of the crucial issues essential to improving the quality of the environment nationally and internationally;
- to create a wider public understanding of the significant services provided by local authorities which have an impact on improving and maintaining the quality of the environment;
- to establish priorities for the environmental issues which require positive action by local and central government to ensure future generations enjoy a quality of life not impaired by environmental degradation; and
- the building of links within the EEC to enable the UK to contribute to environmental quality initiatives and to achieve a greater understanding within the Commission of the role of local government in environmental quality controls.

At the Conference the Association will be launching its own environmental policy statement.

APPOINTMENTS

Frank Argent has been appointed Director General of the National Association of Waste Disposal Contractors, with effect from March 1989. Mr. Argent was due to retire later this year from the Department of the Environment where he was Head of the Local Environment Quality Division.

The Department of the Environment has announced the appointment of **Dr. Frank Feates** as Deputy Director of HM Inspectorate of Pollution; he will be appointed Chief Inspector later this year. Dr. Feates is currently Chief Inspector, Radioactive Substances and the amalgamation of this post with that of Chief Inspector, Air, Water and Wastes is part of the DoE's plans for an integrated approach to pollution control.

David Gee a former health and safety officer with the General Municipal, Boilermakers and Allied Trades Union is to succeed Jonathon Porritt as Director of Friends of the Earth. David Gee will join FOE in May as campaign co-ordinator, taking over as Director early next year.

INDUSTRIAL NEWS

PORTABLE MEASURING OF EMISSIONS

A new directional sensing sampler for measuring background pollution and the level of fugitive emissions from a specific direction has been introduced by Charles Austen Pumps.

The MD Directional Sensing Sampler has been designed in conjunction with Warren Spring Laboratory; it is thought to be the first relatively low cost equipment which can be transported in the boot of a car and set up by one person for medium term — several weeks or months — surveys of suspected sources.

It operates by continuously monitoring the windspeed and direction by means of an anemometer and windvane mounted on a 5 metre mast. If the windspeed exceeds 0.5 metres/second and the direction is within a preset arc (which includes the suspected source) for more than 10 seconds, air is drawn through a filter, which traps the particulates, and then pumped through a dry gas meter which measures the volumetric flow. The duration of the sampling periods are recorded on an hourmeter.

If the wind direction is not within the preset arc or speed is not above 0.5 metres/second, the background pollution level is sampled via a second filter, gasmeter and hourmeter. To cater for different types of source and site conditions, the directional sampling arc is variable between 0° and 70°. Two limiting orifices control the sampling air flow rate to 5 litres/min. for background and 10 litres/min. for directional sampling which compensates for the inevitably shorter directional sampling periods.

Subsequent photometric analysis of the filters together with the recorded information on background and suspect sample volumes and sampling periods allow an assessment of the contribution of the fugitive emissions to local environmental concentrations. For gravimetric measurements, glass fibre filters can be used.

Reader Enquiry Service No. 8905

RADON MONITORING

"At Ease Radon Monitors" which are accepted by the US Environmental Protection Agency for detection and monitoring radon gas are now being marketed by the Talbex Group plc. The monitors conform to the EPA's measurement protocol which recommends short-term screening and follow-up measurements, and are staightforward to use so that homeowners and contractors can conduct test themselves.

"At Ease Radon Monitors" use a silicon detector to provide short- and long-term measurements of radon concentrations and are equipped with easy to read indicator lights and push-button controls. A similar unit is also available with a special circuitry known as a "data logger"; this maintains in a memory the radon concentration in pre-set time periods.

Reader Enquiry Service No. 8906

CFC RECOVERY AND RECYCLING

ICI Chemicals and Polymers Ltd are now offering CFC customers throughout the UK and Europe extended recovery and recycling services. The scheme which is free of charge will apply to CFCs 11, 12, 22 and 502. ICI will provide customers with drums and cylinders, colour coded by CFC grade, for storage of contaminated CFCs. When full, ICI will collect the containers and recycle the CFCs for sale and re-use. CFC mixtures which cannot be recycled will be disposed of safely by ICI, at a small charge to the customer.

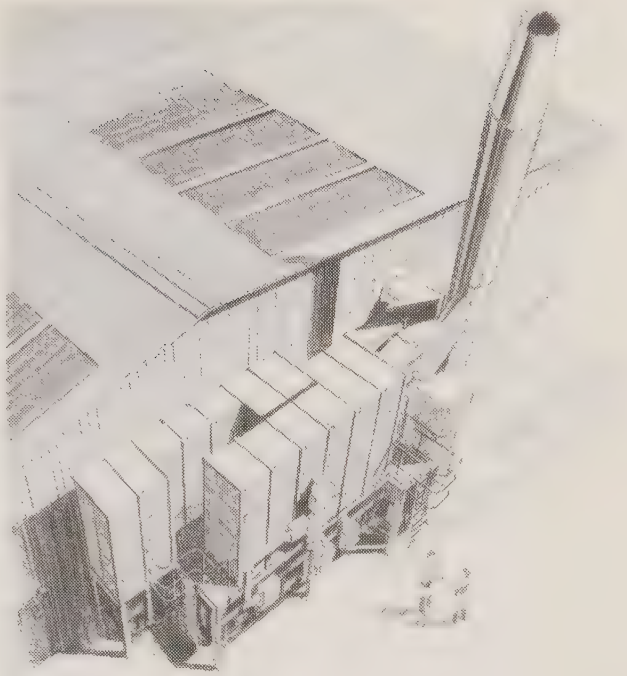
Reader Enquiry Service No. 8907

HOT WATER SYSTEM CLEANSER

A British Company, Beaumont (UK) has developed a "water pasteurization" system which it is claimed completely cleanses polluted hot water systems in minutes and keeps them bacteria free. Water cooling towers of air conditioning systems are thought to be responsible for the recent outbreaks of Legionnaires's disease in London.

Although temperatures inside hot water boilers should be high enough to kill the "legionella" bacteria, cold water at the bottom often means bacteria are not kept at high temperature for long enough. The new technique involves a specially-designed heating element at the bottom of the boiler through which all the water must pass; a series of baffles ensures the bacteria receive the full effect of the high temperature treatment.

Reader Enquiry Service No. 8908



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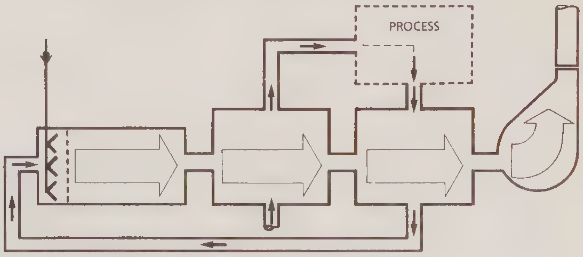

Reader Enquiry Service No. 8909

BOOK REVIEWS

THE ENVIRONMENTAL IMPACT OF REFUSE INCINERATION IN THE UK

M. Woodfield. Publisher: Warren Spring Laboratory, 1987. £25. ISBN 0 85624 476 7.

Although published in 1987, this report from Warren Spring Laboratory, is essential reading for those concerned with the problems of refuse disposal. It does not attempt to cover up the difficulties associated with the existing incinerators for burning Municipal Solid Waste in the UK. The number of incinerator sites is only some 40 and a number of these have been abandoned. The lack of interest in the system has meant that regulations for control of emissions are ill-defined and have not been vigorously applied. Now, however, in view of the satisfactory operations of similar units abroad and increase in realisation that emission of Dioxins and related compounds, hydrochloric acid and inorganic compounds from UK plants is probably well above acceptable limits, increasing interest is being shown in the introduction of control regulations under consideration by the Department of the Environment. Since this report from WSL was published, it has been overtaken by a proposed European Directive which will eventually replace our existing standards and regulations.

Many of the British plants have been developed by a mix of contractors and consultants working to specifications from local Councils and are very varied in design. They will not meet the requirements of the proposed EC Directive. Before the regulations can be applied, however it is important to ensure that sampling and testing methods should be standardised and be compatible with methods developed in Europe and the USA. Various methods are described in detail. It is clear that unification of testing methods used in Europe is essential, if we are to operate with optimum efficiency, accuracy and speed.

Data is supplied on the current emission levels in the UK, European and American plant. Refuse incineration plant in the UK will require major modifications if it is to meet the new EC Directive. As most plant is about 20 years old, replacement, rather than modification, will probably be the most desirable and economical route.

Chimney design and the effect of emissions on the local environment is stressed in the report. It is considered that if the plant operates with the required emission levels, ground level pollution will not be a serious problem either from the nuisance or toxicological point of view.

The precombustion and combustion modifications necessary to reduce Dioxins, unburnt solids and carbon monoxide emissions and methods for cleaning the gases are considered. Particular emphasis is placed on the need for the introduction of adequate instrumentation on British plant.

In the conclusions it is stressed that, as a result of technical and environmental problems, incineration has not won the confidence and support in the UK which it enjoys on the Continent. 20% of the total domestic refuse is burnt on over 500 incinerators in the EC as a whole and 80% have some form of heat recovery. In the UK only 6 incinerator sites are at present equipped to recover energy.

The report was prepared at the request of the Department of the Environment. Having received this precise report from Warren Spring Laboratory and observed the poor state of the MSW incinerator programme in Britain compared with Europe, the DoE must realise that Local Authorities themselves, in the present financial climate, are not likely to invest willingly in newly designed equipment which would be subjected to extensive trials to obtain optimum performance. As suggested in the Autumn 1988 issue of *Clean Air*, the Department of the Environment and the Department of Energy should cooperate to sponsor a prototype waste incineration system designed to meet the proposed EC Directive and to incorporate an efficient CHP scheme at a suitable location. The skill required to test the plant is available at WSL. Other Local Authorities could then develop their own schemes based on the prototype.

We cannot afford to continue to waste energy and contaminate the atmosphere unnecessarily. **Byrom Lees.**

THE SICK BUILDING SYNDROME — SYMPTOMS, RISK FACTORS AND PRACTICAL DESIGN GUIDANCE

I.N. Potter. Publisher: The Building Services Research and Information Association. £15. ISBN 0 86022 2128

A useful report, which tackles the complex relationship between the symptoms and risk factors associated with sick building syndrome. It draws on national and international sources to identify the parameters which can cause similar symptoms, providing practical guidelines and a protocol to minimise symptoms. There is an extensive bibliography and glossary of medically related terms.

BSRIA have also launched a building and health database of over 2000 bibliographic references to be updated quarterly. A subscription rate of £850 includes four updates. For more information contact The Information Centre, The Building Services Research and Information Association, Old Bracknell Lane West, Bracknell, Berks. RG12 4AH.

ACIDIFICATION IN TROPICAL COUNTRIES: SCOPE 36

Ed. Henning Rodhe & Rafael Herrera . Publisher: John Wiley and Sons. ISBN 0 471 91870 9

Prompted by the widespread environmental effects of sulphur and nitrogen oxide emissions in the industrialised countries, SCOPE instigated research into the susceptibility of tropical ecosystems to acidification. This book reflects current understanding of the potential for acidification in five tropical countries.

NOISE CONTROL IN THE BUILT UP ENVIRONMENT

Ed. John Roberts and Diane Fairhall. Publisher: Gower 1988. ISBN 0 566 09001 5

This is a practical manual pinpointing the wide range of noise hazards found in and around the built environment. It considers all aspects of both preventative and remedial noise control options, and assesses the degree of sound reduction likely to be achieved by each method. This is a useful handbook for anyone immediately concerned with environmental noise pollution.

THE REALITIES OF NUCLEAR POWER: INTERNATIONAL ECONOMIC AND REGULATORY EXPERIENCE

S.D. Thomas. Publisher: Cambridge University Press, June 1988. £35. ISBN 0521 32750 4.

Case studies examine the development of the nuclear power industries of Canada, USA, France and the Federal Republic of Germany, the regulatory structure as well as economic and technological performance. Safety regulations, institutional structures, standardisation of design and "user — producer" relations, are also looked at and their effect on future developments assessed.

THE FUTURE OF NUCLEAR POWER

Geoffrey Greenhalgh. Publisher: Graham Trotman Ltd. 1988. ISBN 0 86010 987 9 Price £42

A study, written by a leading consultant on nuclear affairs, aims to present a balanced argument for the continuing development of nuclear power as a safe source of energy. It covers in detail the major issues and options at the centre of the nuclear debate — energy need, radioactivity, environmental and economic issues, accident risks, waste management and disposal. The author concludes that "the decision whether or not to proceed with nuclear power is a political decision that must involve government, parliament, regulatory and administrative authorities, industry, labour and the public. . .in the end it is the clean, safe operation of nuclear facilities which will provide the only convincing evidence on which judgements on the future of nuclear power can be made".

It is a thought-provoking book for anybody interested in the current energy debate.

WHO'S WHO IN THE ENVIRONMENT — SCOTLAND

Compiled and Edited by Sarah Cowell, The Environment Council. Published by the Countryside Commission for Scotland, 1988. ISBN 1 85397 060 3

Information on over 150 environmental and conservation organisations with an office in Scotland. As well as name, address, telephone number and contact person, brief information on the aims and activities of each organisation is given. Available free from the Environment Council, 70 York Way, London N1 9AG. Send SAE (26p A5).

SAFE AS HOUSES?
CFCs IN BUILDINGS: INSULATING FOAMS AND AIR CONDITIONING

Fiona Weir, Friends of the Earth. January 1989. £4. ISBN 0 905966 68 6

Following their successful campaign to encourage manufacturers to eliminate CFCs from aerosols, FOE have now turned their attention to CFC use by the Building and construction industry. FOE point to the fact that suitable alternative materials are available for the vast majority of insulating uses; the report notes that alternative blowing agents and refrigerants are still being developed, and in the interim chemical alternatives with less ozone-depleting potential should only be used where no technical alternative exists.

ALTERNATIVES TO CFCs

Friends of the Earth, March 1989. £4.00. ISBN 0 905966 74 0.

This further report from FOE in its campaign for the elimination of CFCs looks at the use of CFCs in aerosols, foam plastics, refrigeration and electronics and other cleaning applications; it examines the alternatives which are already available, commenting on their efficacy and environmental impact. Friends of the Earth say that they are convinced that the great majority of CFCs used in the UK can be eliminated within the next couple of years given the political will. They call for all aerosol uses to be reformulated within a year; about 85% reductions in refrigerant use to be achieved in the next two years; and for the electronics industry to be required to make an 85% reduction in CFC use as a solvent.

AIR POLLUTION, THE AUTOMOBILE AND PUBLIC HEALTH

Ed. Ann Y. Watson, Richard R. Bates, Donald Kennedy. Publisher: John Wiley and Sons Limited. ISBN 0 309 03726 3 pp692.

Sponsored by the US Health Effects Institute, the book evaluates the impact of automotive pollution on public health in America. It draws on the knowledge of 25 experts in the fields of atmospheric pollution and the effects of toxic substances. Divided into two sections — Exposure Analysis, covering research and human exposure, the relationship between dose and effect — and 'Biological Effects' examining whether responses to emissions constitute a health hazard. A strategy for pursuing research relevant to the health impact of automobile emissions is put forward.

COUNCIL FOR ENVIRONMENTAL EDUCATION — ANNUAL REVIEW OF ENVIRONMENTAL EDUCATION

Publisher: CEE, £10. (£8.00 Members) ISBN 0953 042

This Annual Review provides information on trends, initiatives and the direction of environmental education. It contains around 30 articles covering progress, research and development and case studies together with reports from member organisations. It should be of interest to anyone concerned with what is happening in environmental education.

NATURAL RADIATION EXPOSURE IN UK DWELLINGS

A.D. Wrixon and others, National Radiological Protection Board. Publisher: HMSO, 1988. £10. ISBN 085951 260 6

Detailed results of a systematic national survey of gamma-ray dose rates and radon concentrations in 2000 UK dwellings, and surveys in regions with expected high yields. The report reveals that the range of exposure to radon decay products is much wider than previously estimated. This has already led to government agreement that action needs to be taken to reduce high radon concentrations in existing dwellings and measures to prevent it in new ones. Current estimates are that about 20,000 dwellings mostly in South-West England require attention.

WATER POLLUTION LAW

William Howarth BA, LL.M. Publisher: Shaw and Sons. 1988. £29.95. ISBN 0 7219 11005.

Water quality standards and the control of river pollution discharges of effluent into the sea are issues which will be the focus of much attention during the passage of the water industry privatisation bill. Water Pollution Law provides a comprehensive analysis of the various acts, regulations, functions of control authorities (current to February 1988), mainly in England and Wales; as such it will be a useful reference book for all those involved in the future of water pollution law. A final chapter looks at the future for water pollution control.

FLUE GAS AND FLY ASH

Ed. P.F. Sens and J. K. Wilkinson. Publisher: Elsevier Applied Science. £24. ISBN 1 851 66324

The book contains the proceedings of a contractors meeting organised by the Commission of the European Communities, Directorate General for Science Research and Development, held in Brussels on 16 June 1988. This is the third publication from the Energy Research and Development programme Utilization of Solid Fuels. The meeting provided a forum for discussions on aspects of flue gas treatment and fly ash properties, re-use and disposal and concludes with suggestions for future work in the area.

EDITED PROCEEDINGS, NINTH INTERNATIONAL LEAD CONFERENCE

The proceedings of the Ninth International Lead Conference, held in Goslar, Germany FR, October 1986; Publisher: Lead Development Association on behalf of the organisers, the European Lead Develoment Committee. Available from Lead Development Association, 34 Berkeley Square, London W1X 6AJ, price £30.

The conference covered all aspects of lead research, technology and markets. Papers presented included the structure of the lead industry, factors affecting the choice of production technology, supply questions and production patterns, and the role of the secondary lead industry. Papers were also presented on some of lead's emerging technologies such as giant batteries for load levelling or frequency management, the disposal of nuclear wastes and the stabilisation of asphalt.

FUTURE EVENTS

9-11 MAY — WORKSHOP: WORKING WITH EIA . . ?
Two and a half day workshop providing opportunity to become familiar with current methodology and implications of environmental impact assessment.
Venue: University of Salford.
Details: Environmental Resources Unit, University of Salford. Tel: 061-736-5843, extension 235/7420.

9-22 JULY — INTERNATIONAL SEMINAR: ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT
Sponsored by the WHO and UNDP, the seminar will present a comprehensive introduction to the aims and scope of EIA, in the context of environmental management strategies. Methods and techniques which can be used to assess the impacts of proposed major development actions will be looked at.
Venue: University of Aberdeen.
Details: Centre for Environmental Management Planning. Tel:0224-272480 Fax: 0224 487658.

4-5 JULY — CONFERENCE: CONTROL OF EMISSIONS FROM INDUSTRIAL COMBUSTION PROCESSES
Two day conference reviewing current and projected standards of emission and the potential European environmental legislation.
Venue: Gloucester Hotel, London SW7.
Details: Katie Lye, IBC Technical Services Ltd. Tel: 01-236-4080.

11-12 JULY — CONFERENCE: CARING FOR THE FUTURE
The objective is to promote a local government 'green' perspective and a range of environmental policies.
Venue: Newcastle-upon-Tyne.
Details: Association of Metropolitan Authorities. Tel:01-222-8100.

11-15 SEPTEMBER — 8TH WORLD CLEAN AIR CONGRESS AND EXHIBITION
The Central theme of the Congress is 'Man and his Ecosystem', and lecture and poster sessions will include air quality in public buildings, the home and the car; emissions — air pollution control; acidification; integrated pollution control.
Venue: Congress Centre, The Hague.
Details: Netherlands Congress Centre, PO Box 82000, 2508 EA, The Hague, The Netherlands.

2-5 OCTOBER — COURSE: AIR POLLUTION
An intensive short course dealing with atmospheric processes, monitoring instruments and strategies.
Venue: University of Essex.
Details: Dr. R.M. Harrison, Institute of Aerosol Science, University of Essex, Colchester CO4 3SQ.

23-26 OCTOBER — 56TH ANNUAL CONFERENCE OF NATIONAL SOCIETY FOR CLEAN AIR
Venue: Scarborough.
Details: NSCA, 136 North Street, Brighton BN1 1RG. Tel: Brighton (0273) 26313 Fax: Brighton (0273) 735802.

23-27 OCTOBER — ECOTECH 89
International waste processing, recycling and environmental management exhibition.
Venue: Exhibition Centre, Utrecht, Netherlands.
Details: Overseas Trade Show Agencies. Tel: 01-487-5831; Fax: 01-487-3480.

1990

3-5 APRIL — CONFERENCE: EFFLUENT TREATMENT AND WASTE DISPOSAL, LEEDS
Details: The Institute of Chemical Engineers, 165-171 Railway Terrace, Rugby, CV21 3HQ.

5-8 JUNE — VTH WORLD FILTRATION CONFERENCE, NICE, FRANCE
Details: M. Didier Roger, 21 Avenue de la Division Leclerc, 94230 Cachan, France.

6-8 JUNE — 16TH WORLD CONGRESS OF INTERNATIONAL ASSOCIATION AGAINST NOISE, BRIGHTON
Details: National Society for Clean Air, 136 North Street, Brighton, BN1 1RG.

TWO VALUABLE NSCA PUBLICATIONS

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The history of air pollution in the UK
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Measurement and control of process odours
British Standards relating to air pollution
SI units and conversion factors

SECTION 2 NOISE

An outline of the law relating to noise (including EEC legislation)
Noise abatement zones
Measurement of noise
Noise and the worker
Neighbourhood noise
Transport noise
Low frequency noise
British Standards relating to noise

SECTION 3 WATER POLLUTION

The law relating to water pollution (including EEC legislation)
British Standards relating to water

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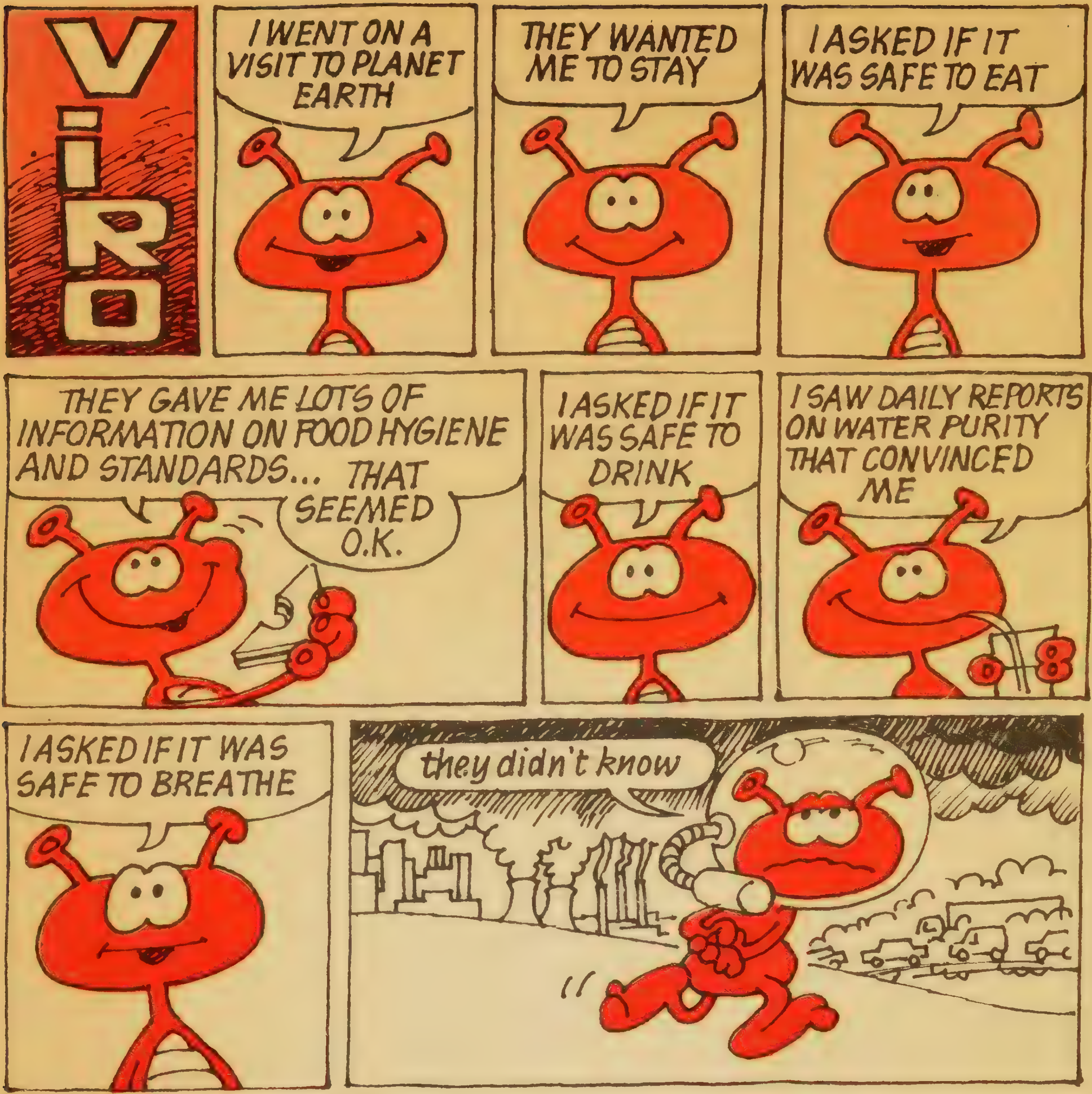
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I WENT ON A VISIT TO PLANET EARTH
THEY WANTED ME TO STAY
I ASKED IF IT WAS SAFE TO EAT
THEY GAVE ME LOTS OF INFORMATION ON FOOD HYGIENE AND STANDARDS... THAT SEEMED O.K.
I ASKED IF IT WAS SAFE TO DRINK
I SAW DAILY REPORTS ON WATER PURITY THAT CONVINCED ME
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they didn't know

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SUMMER 1989

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EDITORIAL

CLEAN AIR — 90 YEARS OF PROGRESS?

Our 90th Birthday Celebration — see page 61 — provided a happy interlude in which to toast the achievements of our predecessors. The clear message from our President was that for those of us who continue the fight for clean air, it should also be seen as the pause that refreshed so as better to tackle the tasks ahead. There can be no room for the complacent: air pollution gives increasing cause for concern and pollution is on the national and international agenda as never before. However, few of the issues are new — more and better research throughout the world leading to better understanding of cause and effects has provided the underlying imperative.

Looking at the index for Clean Air during our 80th Anniversary year in 1979, one sees that the Spring Workshop dealt with pollution from road vehicles; we reported an article in the *New Scientist* about the possible link between deforestation, the build-up of atmospheric carbon dioxide and global warming. In his Presidential Address to the Annual Conference, Lord Flowers looked at the interaction between energy, acid rain and the environment — a theme returned to at the 1988 Conference by Lord Ezra and various other speakers. In 1979, too, the Department of the Environment published its second report on the effects of CFCs, concluding with the importance of continuing research into the uncertainties of their role in the depletion of stratospheric ozone. So while all the major issues were identified in 1979, it has taken nearly a decade of EEC legislation and international agreements to force a reluctant Government to give environmental protection the priority which it demands. Our developing understanding of pollution science suggests that even these internationally agreed measures may not be enough.

It is interesting to reflect that ten years ago smoke control was still a major part of the Society's remit. Today the NSCA's agenda has widened beyond recognition. Along with air and noise pollution we now take into account water pollution, waste management and energy issues — thus reflecting the current approach to Integrated Pollution Control. Perhaps, however, the major difference between 1979 and 1989 is the almost universal acceptance — both by the general public and politicians — that we cannot afford to procrastinate further before putting into effect those policies and actions necessary to safeguard the environment for future generations.

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INDOOR AIR POLLUTION
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WASTE DISPOSAL - THE CHANGING SCENE
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NSCA NEWS AND VIEWS

NSCA CELEBRATION AT HOUSE OF LORDS

A 24 hour strike of both London buses and the underground on 15 May, as well as an overtime ban on BR Southern Region did not deter over 100 members and friends of NSCA from attending our 90th "birthday party".

NSCA President, Lord Nathan hosted a buffet reception in the Cholmondeley Room at the House of Lords which was much enjoyed by all the guests, many of whom had had fairly lengthy walks across London.

Earlier in the day NSCA had signalled its intention to change its name to the National Society for Clean Air and Environmental Protection, thus reflecting the Society's widening agenda. The proposed new name recognises the need to develop an integrated approach to pollution problems, ensuring that solving one does not lead to others. Over the years NSCA has increased its areas of interest to embrace noise, energy, waste disposal, water, agricultural pollution and other environmental issues which are all inevitably linked to air pollution.

Lord Nathan welcomes Mrs. Virginia Bottomley MP

The name change will be put to the Society's AGM in October for formal approval.

Government business meant that junior Environment Minister, Virginia Bottomley was only able to attend for a short while. She congratulated the Society on all its achievements over the past 90 years, and recalled that it was largely the result of the Society's campaigning for the Clean Air Acts that London was now a more healthy place to live and smogs a thing of the past. She noted the expanding agenda of the NSCA as evidenced by its proposed name change. The development of HMIP and integrated pollution control and the move towards legislation next year all pointed to the continuing and crucial role of NSCA in environmental protection.

Lord Nathan in thanking Virginia Bottomley paid tribute to her achievements — sales of unleaded petrol now account for 16% of the market. He also said that the fact that the Society's membership was so diverse and its reputation for sound and balanced research would ensure a continuing — and increasing role — for the NSCA.

A copy of *Clean Air — 90 Years of Progress* commemorating the Society's 90th anniversary has been enclosed with this issue of *Clean Air*. This reviews the Society's achievements and charts the history of air pollution control in the 19th and 20th centuries.

LETTER FROM THE PRESIDENT OF THE INSTITUTION OF ENVIRONMENTAL HEALTH OFFICERS

I am writing on behalf of the Institution of Environmental Health Officers to convey, through you, to the National Society for Clean Air our most sincere congratulations on achieving its ninetieth anniversary.

The history of the Society shows many diverse phases in its fortunes and influence, but it shows also an unwavering and undivided approach to its objectives, and if the way has been strewn with disappointments there have also been some magnificent rewards for persistent campaigning.

It is the Institution's privilege to share many of the tasks the Society undertakes, and it is our privilege to give support, and to wish you well in the coming years. The public is indebted to the Society for all that it has done in fighting for clean air, and I am sure that that debt will continue to grow as the campaigning is continued.

With congratulations on past achievements, and with best wishes for the future,

Yours sincerely,
Eric Foskett
President

NSCA Secretary-General John Langston, Deputy Chairman Frank Shephard, Chairman Bill Snow, and President Lord Nathan

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NEW NSCA INFORMATION LEAFLETS

Three new leaflets have recently been published in NSCA's series of information leaflets for the general public and schools.

Greenhouse Effect explains the factors which appear to be responsible for the current global warming, and its possible effects.

Radiation and You describes the sources of radioactivity to which we are routinely exposed, how large they are, and the methods used to protect the public.

Indoor Air Pollution is a six-page guide to air pollution indoors — from household chemicals, building materials and smoking, to radon, micro-organisms and allergens.

Price £3.95 per 100 or £24.50 per 1000.

Sample leaflets are available on request.

NSCA CAMPAIGN

STRAW AND STUBBLE BURNING SURVEY: 1988

For many years now the NSCA has been campaigning for a ban on straw and stubble burning. The NSCA has backed its view that straw and stubble burning can be a major source of air pollution and nuisance with information from local authorities about complaints received and enforcement and effectiveness of local bye-laws. In 1985, MPs gave their support to our policy by signing an Early Day Motion calling for a ban. Worries about the "Greenhouse Effect" have also reinforced the arguments for preventing the unnecessary combustion of biomass.

During the last couple of years, the issue has received very little media attention. However as our survey carried out after the 1988 harvest shows, despite the rather wet summer and widespread adoption of the 1984 and 1985 model bye-laws on straw and stubble burning, the level of complaint still remains much the same. The results of our 1988 survey are compared with those for 1986.

For the 1988 survey all local authorities in the United Kingdom were sent a questionnaire; of these 168 sent back a nil return (ie no problem/no straw or stubble burning) and a further 174 provided information on the situation in their area.

Observation of Bye-Laws

Sixty-seven local authorities reported that the bye-laws had not been adhered to, the majority reporting non-compliance with more than one section. The following figures show the main areas of non-compliance (1986 figures in brackets):

— lack of firebreaks	32 (40)
— inadequate fire supervision	26 (24)
— failure to incorporate ashes	25 (19)
— failure to notify relevant authorities	30 (26)
— burning in high winds	23 (16)

Other problems reported were burning after sunset or at weekends, general smoke nuisance and damage to trees.

Enforcement Problems

Seventy-one local authorities reported difficulty in enforcing the bye-laws, of which 57, (55 in 1986) gave insufficient staff resources for surveillance as the main reason. This is a particular problem in large rural areas. Other problems related to:

— difficulty in locating burns and gaining access	27 (34)
— difficulty in gaining evidence for prosecutions	13 (14)
— difficulty in enforcing 36 hour ash incorporation period	14 (12)

Complaints from the Public

A total of 101 local authorities received complaints from the public (99 in 1986) about straw and stubble burning, of which the main ones concerned:

— smoke/smut nuisance	160 (172)
— reduced visibility on roads	35 (39)
— effects on human health	8 (12)
— threat/damage to property	13 (13)

Complaints ranged from concern about contamination at food premises, general objections to the practice, 20 complaints about oil seed rape burning and concern about the practice contributing to the "Greenhouse Effect" and acid rain.

Fire Brigade Involvement

Nearly 40 local authorities reported that the fire services had been called out to stubble fires. There were 107 separate call-outs (105 in 1986), but some local authorities were unable to provide statistics. It should be noted that not all the calls to the fire brigade were the result of burning getting out of control. A local authority in Hertfordshire reported that of six call-outs five fires were thought to be caused by arson or children with matches. Two other local authorities also reported fires started by vandals.

Prosecutions

Fifteen local authorities had started proceedings for breaches of the bye-laws. Of the 20 prosecutions (32 in 1986) pending most were for inadequate firebreaks. No prosecutions for smoke nuisance under the Clean Air Act were being considered.

Effectiveness of Bye-Laws

It would seem that while a majority of those local authorities who have adopted either the 1984 or 1985 bye-laws considered that they were effective for dealing with straw and stubble burning in 1988, a significant minority did not, particularly for prevention of smoke and smut nuisance. A district council in North Yorkshire commented on an incident where it appeared that although the bye-laws were being fully complied with, a substantial area of housing had been subjected to a severe nuisance from smoke and smuts for between 1-2 hours.

The analysis of returns relating to effectiveness of the bye-laws is as follows (1986 figures in brackets):

Effective for:	**Yes**	**No**
fire prevention	120 (119)	61 (8)
prevention of smoke/smut nuisance	63 (41)	74 (92)
preventing threat/damage to property	126 (112)	9 (13)
preventing threat/damage to wildlife	81 (85)	44 (32)

Support for a Ban

Of the 174 local authorities who completed the questionnaire, 151 stated that they would support a ban on straw and stubble burning. Of these 52 have expressed official support; a further 26 support a ban, although this has not been expressed formally; and the environmental health departments of a further 73 local authorities also support a ban.

It should also be noted that of those authorities who submitted a "nil return" — ie no stubble burning in area/no problems — a number expressed their support for a ban.

Alternative Methods of Straw Disposal

Although both the Ministry of Agriculture, Fisheries and Food and the National Farmers' Union have promoted alternative uses for straw — eg incorporation, fuel, and bedding — there is still little evidence of farmers' using other methods. Under half the local authorities who responded had the impression that farmers now regarded burning of straw and stubble as a last resort.

Conclusion

From our survey, it is clear that for many local authorities within whose boundaries straw and stubble burning takes place, the practice continues to create serious problems. In both 1988 and 1986 comparable problems were experienced. Fire-break requirements and non-notification posed the major problems; these appear to be compounded by the fact that nearly a third of local authorities reported that they had insufficient staff for surveillance, so that it is difficult to assess the full extent of the burn in areas where non-notification is suspected.

There is also very little difference in the number and nature of complaints over the last two years. The number of fire brigade call-outs has remained more or less constant, and smoke/smut nuisance is still a major source of complaint, even in cases where bye-laws are being complied with. This suggests that the introduction of bye-laws has only been partially successful in reducing the problem of stubble burning. Further action is still needed and the NSCA will continue to campaign for a complete ban on straw and stubble burning to be introduced as soon as reasonably possible. Until such a ban, the NSCA supports the adoption of more stringent controls. While the 1985 model bye-laws have closed some loopholes, important aspects are still outstanding:

- Farmers should be required to check forecast windspeed with the local weather forecast station, and not to burn if they exceed force 3.
- The hazard of burning near railway lines should be taken into account; thick smoke will obscure signals and hide obstructions on the line.
- Potato haulm should be included in "other crop residues" since this is burnt extensively in some areas.

Finally, the NSCA would like to see more attention being paid to alternative methods of straw disposal. For instance, in some areas of the UK, the soil is suitable for incorporation of straw: this can help to ensure the efficient use of fertiliser, since the straw adds valuable carbon to the soil. Other uses include: straw as a fuel; as animal feed; for animal bedding; in horticulture; for paper and board manufacture; in chemical production and as thatching.

This report was compiled by the NSCA Information Department. The full report is available price £5.00 inclusive of postage and packing.

NSCA SPRING WORKSHOP

TAKING INDUSTRIAL POLLUTION CONTROL INTO THE 1990s

Once again Lincoln College, Oxford provided the ideal setting for the NSCA's Workshop which attracted more than 100 participants. NSCA President, Lord Nathan remarked on the very wide range of expertise and disciplines represented which he said reflected the current importance attached to pollution control and its regulation.

European Commitments

The first workshop session, chaired by Lord Nathan, looked at new industrial air pollution control legislation. Nigel Haigh of the Institute for European Environmental Policy reviewed European legislation and its increasing influence on the UK, and Neil Sanders of the DoE's Air Quality Division explained how the UK is meeting its European obligations. He was closely questioned on the implementation of the Large Combustion Plants Directive and the way in which it is envisaged the UK will meet national emission limits.

The CEGB's commitment to reducing its own SO_2 emissions was questioned in the light of the recent news that it was no longer planning to fit FGD equipment at Fiddlers Ferry, although the Drax programme was going ahead. The UK's ability to meet national emission limits without the full participation of the CEGB had to be in doubt given that power stations are responsible for up to 75% of UK emissions of SO_2.

In reply Neil Sanders said that much of the Large Combustion Plants Directive would be implemented through BPM notes. New legislation would be required incorporating the national emission limits imposed by the Directive; a consultation paper would be issued, he said, within the next 2-3 months. He did not accept that the UK's programme for sulphur reduction was inadequate. The UK was spending £1.5 billion on its programme making it the second biggest in Europe: Drax when completed, would be the biggest FGD plant in the world. He was not prepared to commit himself on other components of the sulphur reduction programme, saying that delegates must "wait and see" what the consultation paper says.

BATNEEC

The role of the recently established Local Authority Unit was comprehensively explained by Dr. Martin Bigg (see this issue). One of its main tasks at the moment is the preparation of notes on BATNEEC for Part B processes (ie those to come under local authority control). Case studies looking at glass, iron and steel works, and inedible animal by-product works showed the wide range of difficulties to be resolved if the guidance notes were to be workable. Dr. Bigg said that the accent was on achievable and practicable proposals — there was no point in setting emission limits which could not be monitored or tested.

Inevitably — and an issue which recurred throughout the two-day workshop — the question of resources was raised: could “best available technology” be reconciled with “not entailing excessive costs”? To what extent could or should the continuing existence of a process be a factor in the level of pollution abatement equipment to be installed? A situation was envisaged where expenditure on such equipment might result in a process becoming economically unviable, leading to closure and a subsequent increase in local unemployment and other adverse effects on the area.

IPC: the next step

The second day of the workshop looked at the Government’s proposals for moving to a system of integrated pollution control. Gareth Bendon of the DoE said that responses to the July 1988 consultation paper were now being considered and it was hoped that legislation to implement IPC would be included in the next session of Parliament. IPC will apply to those industrial processes potentially most dangerous to the environment — about 3000 processes in England and Wales — including those which discharge “Red List” substances to water. HMIP will have prime responsibility for implementing IPC though there will be a requirement to consult other pollution control authorities where responsibilities overlap. Gareth Bendon also outlined the Government’s proposals for cost recovery charging (see Update section of this issue of *Clean Air*) which it was expected would yield up to 75% of HMIP’s total estimated expenditure on IPC.

Other papers in this session looked at integrated pollution control as it will affect the future of both water and waste pollution control as well as the impact of IPC for local authorities. Joe Barbour felt that the objectives of IPC were to be welcomed by industry though there was still a need to clarify the system and criteria under which the process industries are to operate from both home and EEC standpoints.

In the discussion which followed the presentations, delegates raised a number of issues relating both to the successful introduction of integrated pollution control, and to the increased responsibilities of local authorities for Part B processes; these included:

- a fully resourced and staffed Inspectorate, able to attract and keep staff of sufficiently high calibre. It was also important that the Inspectorate maintained its independence from politics and other interests.
- better information base from the Department of Environment and improved communications between local authorities and the public and local authorities and industry. Perhaps the Society should look at what it could do in this connection.
- how were local authorities to acquire the necessary skills to carry out their responsibilities; who would provide the training and how it would be funded were questions needing answers. It was not enough for training to be done on an ad hoc basis.

All the papers presented at the workshop will shortly be available from NSCA, price £15 or £1.50 per paper.

NSCA COMMENT

CLIMATE CHANGE

Earlier this year the House of Lords Select Committee on Science and Technology set up a sub-committee to consider the scientific grounds on which policy relating to the Greenhouse Effect should be based, and what action is required by the UK. NSCA's evidence, see below, was prepared by its working group on climate change.

Introduction

Climate has changed in the past due to natural processes which are still poorly understood. This has generated the extremes of climate seen in the British Isles between the last glacial advance, when large areas were permanently covered by ice and the post glacial climatic optimum (5000-3000 BC) when much of England experienced a climate reminiscent of the Mediterranean today. More recently a warm period about AD 1000-1250 allowed fine wines to be produced as far North as York and the Vikings to colonise Greenland. By the 17th and 18th centuries a "Little Ice Age" had developed when the Thames regularly froze in London.

Any man induced climatic change will be superimposed upon natural changes. On a geological timescale, the Earth is currently experiencing an interglacial period within the Pleistocene Ice Age. Further glacial advances are possible, even probable.

Man-induced Climatic Change

The temperature of the Earth is influenced by the chemical composition of its atmosphere. Certain gases such as water vapour, carbon dioxide, methane and halocarbons are transparent to incoming solar radiation (UV) but partially opaque to outgoing terrestrial long wave radiation. Any change in concentration of these so-called greenhouse gases may change the existing temperature pattern.

There is incontrovertible evidence that the concentrations of carbon dioxide, methane and halocarbons have been increasing as a result of mankind's activities, mainly over the last 200 years. The world's existing population of five billion could well double in the next century, and a considerable increase in the production of such gases must be expected as a result of growing population and rising material expectations.

Global atmospheric circulation models have been used in an attempt to predict the consequence of the rise in concentration of greenhouse gases. These models involve significant simplification of complicated atmospheric processes and assumptions which may or may not accurately reflect reality.

In particular the models used up to the present time do not adequately address all the feedback mechanisms which may occur as the atmosphere retains more energy. For example, cloud cover could be expected to change and because the atmospheric energy balance is very sensitive to cloud amount and type, strong, possibly negative, feedbacks might occur. Snow cover, biological activity and atmosphere-ocean interactions are other parameters with potentially important feedbacks, some positive, others negative. Only when these processes are better understood and quantified more completely can their respective effects be used with confidence in models designed to predict the influence of mankind's activities on global climate.

Present models predict significant increases in global temperature within the forthcoming five or six decades. Whilst in reality a concomitant rise in temperature is detectable over the past century, its magnitude falls within the range which might be expected from purely natural causes; it cannot be attributed with complete confidence to the Greenhouse Effect.

The regional patterns of any climatic change are not yet predictable. Nor is it clear how any change in climate will be reflected in the frequency of events such as hot summers, warm winters, droughts or very wet spells that might now be considered extreme.

Consequences of Man-induced Climatic Change

It is a major concern of this Society that what research has been undertaken into climatic change has done as much to indicate the extent of our ignorance as to help us predict future changes. We draw attention to the fact that the media, and some scientists, are presenting the "Greenhouse Effect" as proven, and already operating. In fact the picture is less clear-cut; so many factors interact, often in ways which are barely understood, that it is impossible to predict the likely consequences with any certainty. It is expected to be well within the capabilities of man and nature to adapt to small gradual changes in climate occurring over a prolonged timescale. However in the event of more rapid changes, serious disruption of socio-economic systems would be expected. Under these circumstances the most important disruption would be a possible rise in sea level and changes in the viability of agricultural systems.

Whilst the scientific basis for climate change continues to be hotly debated, politicians must consider what initiatives need to be taken in order to clarify the issues involved, and to develop appropriate policy. There is, indisputably, a need for increased research. Policymakers must also adopt a precautionary approach to preventing the potentially serious disruption which any climate change might have. In particular, policies which would benefit society and the environment, irrespective of climatic considerations, should be given high priority.

Research Needs

There are many more questions than answers in the climate change debate. The UK has a number of leading researchers in the field, and an internationally-acknowledged centre of excellence in the Meteorological Office. These must be given increased support. This Society is concerned, however, that whilst climatic modelling is a useful and relatively inexpensive tool, the actual scientific data base from which predictions are made is inadequate. This should become the prime focus for research expenditure, which sits ill in the light of the recent decision to cut UK expenditure on oceanographic research. A basic programme of observation and sampling is the major requirement for a better understanding of climatic processes. This should include study of the stratosphere and the oceans, about which knowledge is poor in comparison with the more extensively monitored troposphere.

There is clearly a need for international co-operation in determining priorities and provisioning for research. The following areas all require urgent attention:

— Identification of the causes and trends of natural climatic change.
— Identification and quantification of feed-back mechanisms.
— Improved predictive models.
— Development of detailed emissions inventories of carbon dioxide and methane.

In addition to these scientific goals, energy-related research and development is needed in connection with:

— Development of non-fossil fuel energy sources.
— Development of energy efficiency measures and energy conservation programmes.
— Development of carbon dioxide and methane emission control technology.
— Development of replacements for CFCs. These should not be significant greenhouse gases.

Policy Actions

It is most important that this global issue is addressed on an international basis. Only efforts backed by the full co-operation of all national governments are likely to succeed.

Despite very real scientific uncertainties it would be prudent to instigate remedial policies which have additional societal benefits. It should be remembered that any physical resource use has an environmental impact, and there is an underlying benefit to the environment in minimising all such use. Ultimately, social factors such as population growth and human resource use will need to be addressed. Such policies should include:

— Internationally co-ordinated energy efficiency/economy programmes.
— An end to mass deforestation.
— Active afforestation where ecologically appropriate.
— An eventual total ban on the manufacture of halocarbons.
— Incentives to use renewable energy resources.
— Reduction of all resource consumption.

Contingency plans should be formulated to deal with any major or rapid change of climate which is not addressed by the prudent actions already discussed.

NSCA COMMENT

THE ROLE AND FUNCTIONS OF WASTE DISPOSAL AUTHORITIES

The Government's proposals for the future role and functions of Waste Disposal Authorities in England and Wales were published in a consultation paper at the end of January.

The main changes proposed are a separation of local authority regulatory functions from their operational functions by the creation of arms' length local authority waste disposal companies; national standards of regulation to be established for authorities to be applied equally to public and private sector facilities; greater public accountability by authorities, with statutory powers for HMIP to examine and report on the way in which authorities carry out their functions; clearer, better targetted, default powers for the Secretary of State in regard to authorities who consistently fail to perform those functions properly. The local authority waste disposal companies will operate in full and fair competition with the private sector. Waste Collection Authorities will become responsible for the disposal of the waste they collect and will be required to seek tenders for its disposal. They will be required to take account of the environmental impact of tenders. The title of Waste Disposal Authorities is to be changed to Waste Regulation Authorities. Complementary consultations are in progress on a number of related proposals, including stronger controls on international trade in waste disposal and measures to combat fly-tipping.

In its response submitted to the Department of Environment in March, NSCA broadly welcomed the proposals, particularly the intention to separate the functions of waste disposal from waste regulation. Giving more flexibility to Waste Collection Authorities in the disposal of waste could, NSCA thinks, also improve opportunities for recycling. Recognition of the need for improved uniformity of control was also welcomed. The Society does have some concerns, however, regarding the balance between local and regional responsibility, and the resource implications of the proposals. Specific comments follow.

Balance of Control

The consultation paper implicitly acknowledges the difficulty of balancing the need for local accountability with the operational advantages of regional co-operation. The existing situation in Wales shows how local expertise and accountability can be maintained at District level, whilst the three Regional Groups on Waste Disposal maintain an overview of the waste disposal function. The success of this system is widely acknowledged.

By comparison the present English two-tier system creates unnecessary complications and is clearly in need of reform, yet the Paper appears to rule out any role for regional co-operation, either on the Welsh model, or as a formal second tier with full regulatory powers. NSCA endorses the value of the democratic accountability of local authorities in waste disposal matters, but considers that the question of regional operations has not yet been fully explored.

Resources

A running theme in recent comments on pollution control from many interested bodies has been the need for more resources. Whilst we applaud the introduction of new legislation, regulations and initiatives in the environmental sphere, recognition must be made of the burden which will fall on those whose task it is to implement pollution control — both at HMIP and local authority level. For example, one local authority member of NSCA has identified 25 different areas of responsibility where pressures have increased, or where new statutory requirements will impose additional obligations.

The appointment of six new Waste Inspectors to HMIP, whilst welcome, also seems unlikely to be adequate in view of the additional responsibilities which these proposals outline. Particularly in the light of the recent report of the House of Commons Select Committee on the Environment on Hazardous Waste Disposal, it is clear that enforcement "on the ground" requires more than simply an improved regulatory framework. The Government has failed to quantify the increasing workload which these proposals embody, and the extra resources which will be needed as a result. Without the appropriate levels of staff, expertise equipment and support services, the demands of effective pollution control will not be met. A clear commitment, firstly to quantify, and secondly to provide, the necessary resources must accompany any proposals which extend pollution control powers.

Responsibility for Closed Landfill Sites

In an annexe to the main consultation paper, reference is made to the "transfer of responsibility for the inspection of landfill sites closed before the operative date of the new legislation from the Environmental Health Authority to the WDA". However, the consultation proposes to abolish Waste Disposal Authorities. If, as seems more likely, the intention is to transfer responsibility to Waste *Regulation* Authorities, we should like to draw attention to the fact that this is nowhere included in the main text of the paper for consultation. Powers for dealing with problems caused by closed landfill sites are currently available to Local Authorities primarily under the Public Health Act 1936. To change enforcement responsibilities would, presumably, require a change in primary legislation. Is this actually what is intended?

MUNICIPAL WASTE

The Department of Energy's Energy Technology Support Unit held a workshop in early May which looked at the control of pollution from the combustion of waste. The workshop was opened by Dr. M. Landy of ETSU who described the changes in the regulations that have taken place within recent years; he particularly emphasised the proposed EC Directive which would regulate the emissions from both industrial and domestic waste, and expressed the view that it was important to settle the regulations as soon as possible so that the municipal waste incineration industry would know the precise regulations to which it had to comply. Various presentations looked at some of the action already being taken in the UK with regard to municipal waste as well as examples of practice in Europe and America.

Byrom Lees, who attended for NSCA, referred to the House of Lords Select Committee on the European Communities which had investigated air pollution from municipal waste incineration plants. He said that the NSCA supported the proposed EC Directives and could see no reason why combustion of waste derived fuel should be treated any differently from bulk combustion of waste. Based on evidence from the literature, the NSCA had supported the dry techniques for removal of hydrochloric acid in their evidence. He pointed out that the House of Lords Committee saw no reason why these standards as minima should not be imposed throughout the Community, and that it saw serious disadvantages to municipal authorities, in particular, in the loss of centrally situated incineration plants, and switching the disposal to landfill sites.

Among the conclusions of the workshop was that the UK is wasting fuel and causing unnecessary pollution by not introducing large domestic waste incinerators with CHP schemes at selected sites. To be economically viable the minimum size is likely to be suitable for dealing with at least 300,000 tonnes of domestic waste per annum. Government or regional support is essential to introduce the first units in this country incorporating techniques and equipment developed in other European countries. If this is not forthcoming, the UK will slip still further behind its colleagues in Europe. It was noted that currently in the UK no domestic waste incinerator is operational which meets the required emission standards and incorporates a CHP scheme. While in many European countries, Japan and the USA, large plant burning bulk refuse have emission standards which already satisfy the new Directives.

CLAY PIGEON SHOOTING

NSCA was dismayed to learn that the Government has bowed to pressure from the clay pigeon shooting lobby and reversed its General Development Order on the number of days shoots can take place without planning permission. This means that shoots can now take place for up to 28 days in a calendar year instead of only 14.

Meanwhile since 1986, the Department of the Environment has been trying to get agreement on a code of practice for clay pigeon shooting. A draft prepared by the CPSA was felt by NSCA to provide inadequate protection, particularly in respect of the separation distance between shooting activities and noise sensitive areas. A new draft has now been circulated by the DoE to which NSCA will be responding.

EAST MIDLANDS DIVISION

Some 52 members assembled at the Tithe Barn, Wellingborough on the 6 April, by kind invitation of the Wellingborough Council. The Chairman, Dr. D. Davies, welcomed members and extended a special welcome to Mr. Sang from China who was currently spending time with the Chesterfield Borough Council. He then introduced the Mayor of Wellingborough, Councillor John Jessop who extended a Civic Welcome to those attending.

Councillor Jessop said he had achieved a number of "firsts" during his year of office and today was another since this was the first occasion which the East Midlands Division of the NSCA had met in Wellingborough. Councillor Jessop said that he had a copy of a document dated 25 February 1949 giving notice of a meeting in Nottingham on Thursday, 7 April 1949 to inaugurate the Division. Thus the occasion was as near as could be to the 40th anniversary of the founding of the Division, and that was a matter for congratulation.

Following a short business meeting, the Chairman introduced Mr. P. Mattli, Works Chemist of the Scott Bader Company Limited who described the background to the Company. The founder Ernest Bader was a Swiss who had spent much of his childhood in England and married here. In 1932 he went into manufacture, and in 1945 he embraced the Quaker faith. He was much concerned with the workforce and in 1951 established a co-ownership company and gave 90% of his shares to a charitable trust — The Scott Bader Commonwealth Limited.

The company makes resins which forms the basis of paints and varnishes with applications in places like oil rigs, and also Emulsion Polymers. Some are "environment friendly" but some — like Acrolytes — had an odour threshold of 1-in-9 million. Although there was no known risk large sums had been spent in trying to combat the smell. Problems tended to stem from people rather than processes. Half a pint of emulsion polymer produced considerable odour. The material was used for cladding, irrigation ditches, car spoilers, cabs on tankers and train and sea transportation.

A tour of the Company's premises included manufacturing areas, experimental sections where materials were being tested at the pilot stage, laboratories where the properties of materials could be tested and other laboratories containing highly sophisticated sampling equipment.

NORTHERN DIVISION

Following his retirement as Darlington Borough Environmental Health Officer, Charles Robson has stood down as Hon. Secretary and Treasurer of the Northern Division. During his tenure the Division has been extremely active, regularly sending reports of Divisional activities to *Clean Air* (other Divisions, please note!) Membership of the Division has grown, with both increased local authority and industrial representation.

The Northern Division was founded in 1933 and Mr. Robson has put together an interesting booklet covering the history of the Division until 1933, drawn from minutes of Divisional meetings. Mr. Robson will not be severing all his links with the Society as he has been elected an Hon. Member of the Northern Division.

REPORT

BATNEEC

APPLICATIONS AND AUTHORISATIONS

by

Dr. Martin Bigg

Local Authority Unit, HMIP

The Local Authority Unit was set up by the Department of the Environment in July 1988, and provides the secretariat for the HMIP/Local Authority Enforcement Liaison Committee (IPLA). At the NSCA's Spring Workshop in April, Dr. Martin Bigg explained the background to the setting up of the Unit and its work.

Background

The fifth report of the Royal Commission on Environmental Pollution (1976) reviewed the methods for policing air pollution. It drew attention to the cross media movement of pollution and the need for an integrated approach. The case was made for a unified Inspectorate which would expand the concept of "best practicable means" (BPM) to ensure the adoption of "best practicable environmental option" (BPEO).

On 28 June 1984 the EC Council Directive on "the combatting of air pollution from industrial plants" was published. In the Directive the concept of BATNEEC (Best Available Technology Not Entailing Excessive Costs) was introduced. The framework Directive requires that:

> "all appropriate preventative measures against air pollution have been taken, including the application of the best available technology, provided that the application of such measures does not entail excessive costs".

This may be compared with the BPM approach adopted by the Inspectorate. In the Clean Air Act 1956, "Practicable" is interpreted as:

> "reasonably practicable, having regard, amongst other things, to local conditions and circumstances, to the financial implications and to the current state of technical knowledge".

It is the Inspectorate's practice to regard the term practicable as being interpreted in this way if no risk to public health exists. The phrase "local conditions and circumstances" is not used to open the way to local derogations for social or political reasons in addition to local environmental factors. HMIP's Chief Inspector for Air, Water and Waste made it clear that it has been used to enforce tighter environmental controls locally.

Although I will continue to refer to notes on best practicable means (BPM) it is probable that they will eventually be called notes on BATNEEC.

A working party was set up in 1985 culminating in the consultation paper issued by the Department of Environment, Scottish Development Department and the Welsh Office in December 1986. It recognised that local councils needed new powers to control a middle range of industrial processes, which did not warrant central control because they were neither potentially gross polluters nor technologically difficult to control, but which could nevertheless give rise to significant local pollution. The consultation paper proposed a more certain and cost effective control system for these industries than is available under the current mix of clean air acts and public health acts, which normally force the local authority to wait for a nuisance to develop before it can act to remedy it. The Government also wish to provide an open and more publicly visible system of control. As a result of the feedback on the first consultation paper a second paper was published in December 1988.

As everyone is probably aware the list of scheduled processes is proposed to be split into a Part A and a Part B. The larger, technically more complex processes are in Part A for control by the National Inspectorate. The smaller, more numerous, less complex processes are in Part B. They will be regulated by local authorities exercising the same prior approval and enforcement roles as currently exercised by HMIP Inspectors.

Authorisations

To introduce a more transparent system of control, publicly available authorisations are to be used for all scheduled processes.

As a first stage the "Control of Industrial Air Pollution (Registration of Works) Regulations 1989" were published. These regulations were an interim measure to implement the requirement of the framework directive for providing a more open and visible system of control.

Whenever a new scheduled works or substantial modification to any existing scheduled works is proposed the operator has to make a formal application which is also advertised in at least one local newspaper in each of two successive weeks. Opportunity is provided for the public to comment. The system is similar to that pertaining to the discharge of liquid effluents to surface waters. Authorisations are recorded in the register held and available for public inspection and copying at the offices of the local inspectorate and local authority.

Authorisations contain details of:

(i) The name and address of the owner of the works;
(ii) The location of the works and the local authority;
(iii) The category of works and the process description;
(iv) Details of the type and capacity of the abatement measures and chimneys;
(v) Sources, types and volumes and presumptive limits of process emissions;
(vi) Details of continuous, manual or environmental monitoring.

Existing scheduled works will be deemed to be authorised. The terms of the authorisations will themselves become legally enforceable conditions when the second consultation paper is to be implemented.

In addition to the requirement to have an authorisation, there remains a general duty on the plant operator to use the "best practicable means" in respect of any other aspect of his operations not specified in the conditions of the authorisation insofar as they are relevant to the control of emissions to air. The measures include provision for aspects of any authorisation to be kept in confidence for commercial or national defence reasons.

IPLA

In the 1986 consultation paper it was recognised that more positive co-ordination between the enforcing authorities was required. Regular liaison would be important to facilitate co-operation in ironing out local problems, to exchange experiences, to help develop an overview of air quality in each area, and to ensure consistency of enforcement policy and practice. This is particularly important considering that there are theoretically about 36 air field inspectors as opposed to about 457 local authorities in England, Wales and Scotland.

As a result the HMIP/LA Enforcement Liaison Committee (IPLA) was set up along the lines of the Health and Safety Executive's HELA Committee. The Committee is not a statutory body but does have an influential steering role. It aims to promote a dialogue in exchange of information between HMIP and the local authorities. It also advises the Secretary of State on the need for and content of National BPM/BATNEEC notes and other guidance.

The Committee meets quarterly and includes three representatives from both the Association of District Councils and the Association of Metropolitan Authorities, two from HMIP and one from HM Industrial Pollution Inspectorate in Scotland; there is also one representative from the Convention of Scottish Local Authorities, the Institution of Environmental Health Officers, the Royal Environmental Health Institute of Scotland, Department of the Environment, Scottish Development Department and the Welsh Office.

Local Authority Unit

This unit provides the secretariat for IPLA and is responsible for the more detailed monitoring of the new arrangements and the production of central guidance for the local authority sector. It also provides appropriate input for the training of environmental health officers. The unit serves as a focal point on enforcement but due to resources is only really able to deal with national policy rather than local difficulties. The main aim of the unit is the production of notes on BPM/BATNEEC for the Part B processes.

The unit should consist of a principal HMIP Inspector, a seconded Principal EHO, and appropriate support staff including a full time secretary and an executive officer. The unit is co-located with the HMIP District Air Office in Birmingham.

Method of Operation

The aim is to produce BPM notes for all the Part B processes which will probably number about 40, by statute date for the new legislation. We are aiming to achieve a workable agreement between the local authority sector, industry and HMIP. It is planned that as the BPM notes are agreed and published so the local authorities should take over responsibility for each process. The availability of resources will dictate how gradual this is going to be.

From discussions with the industries proposed to come into Part B and the local authorities it is clear that there is a very strong driving force to obtain an agreement on BPM. The limiting factors at the end of the day are the resources of the local authority unit.

For each process we have established the same procedure wherever possible:

(i) Exploratory discussions with industry — feedback on consultation paper.
(ii) Establish working party: Industry (2-6), OA (1-2), HMIP (1). Agree first draft (2-3 meetings).
(iii) HMIP circulate and agree first draft.
(iv) First draft to industry, and IPLA members.
(v) Reconvene working party, agree final draft.
(vi) Final draft to industry and IPLA members.
(vii) Publish.

There have been and are exceptions to this procedure. Where there is an absence of strong trade association or the definition or processes cover a very broad area, then the system has been similar to that currently used to draft notes on BPM within HMIP. Following discussion and correspondence with the industry and local authorities a rough first draft is assembled. This is then widely circulated to the industry and interested local authorities for comment. The responses are collated and a further draft circulated before the cycle is repeated. Gradually an agreed first draft is produced. This is very time consuming and inefficient. Points which could be resolved in a single meeting have to be gone over several times.

Problems have been experienced with representation:

(i) Local Authorities
Some local authorities have been unwilling to release officers for the two or three days required or help with travelling expenses. As a result, for example, with the offensive trades, the working party's comments have had to be circulated to local authorities for their input before proceeding.

(ii) Industry
Some companies have refused to participate or allow their representatives to agree to limits. This usually reflects the hope that the proposals and/or legislation will go away or be vetoed. On the European front we are in the realms of majority voting so it is important to get agreement on the wording and implementation of the legislation. With a view to 1992 many forward looking companies are very keen to ensure consistency of enforcement both within the UK and across Europe. They welcome the proposals.

Conclusion

A whole new area is proposed to be covered by Air Pollution Control Legislation. Measures are expected shortly to set up the new two tiered system of control by the National Inspectorates and local authorities. By means of the establishment of IPLA and the LAU the introduction should be smoother and the consistency of enforcement ensured.

Much work has and is being done in the production of BPM/BATNEEC notes for the Part B processes. Due to the breadth of processes to be covered and limited resources of the local authority unit the contributions and support of the rest of HMIP, industry and the local authorities is fully appreciated.

UPDATE

CLEAN CAR STANDARDS AGREED

Tough new vehicle emission limits were agreed by EEC Environment Ministers at their meeting in Luxembourg on 8 June. The emission limits agreed for all cars of less than 1400 cc are 19 grammes per test cycle for carbon monoxide and 5 grammes per test cycle for hydrocarbons and nitrogen oxide. (Current limits are 45 and 15 grammes, respectively.) New model cars must conform from 1 July 1992 and existing ones from 31 December 1992.

The new US-style emission standards for small cars, which can only be met by fitting three-way catalytic converters, are expected to add anything up to £300 to the price, as well as increase fuel costs. However Ministers have agreed that EEC Member states can offer tax incentives of up to 85% of the extra cost of buying a "clean" car until the end of 1992. Denmark, the Netherlands, West Germany and Greece are already planning such a step; the British Government is considering its position on this.

Although the new emission limits will cut pollution from carbon monoxide, hydrocarbons and nitrogen oxides by between 60-70%, the fitting of catalytic converters will do nothing to control carbon dioxide emissions — one of the main greenhouse gases. While lean-burn technology is favoured by the UK Government, the EC Commission is said to be considering speed limits as a means of reducing CO_2 emissions. However such a move would be likely to be strongly opposed by both W. Germany and the UK. It is also expected that the Commission will bring forward proposals to tighten emission limits for large and medium sized cars; these were agreed last year but are not as tough as those now agreed for small cars.

IPC COST RECOVERY

The Department of Environment has published proposals for a system of cost recovery charging for HMIP's operation of integrated pollution control. An initial charge for each new or modified authorisation is proposed, plus an annual charge for all scheduled industrial sites.

The initial charge (which it is expected would yield between 20-25% of the total income) would be related to either the pollution potential of the process (ie least, medium and most polluting) or the size of the investment for new or modified processes requiring authorisation. Four options are looked at for determining the annual charges.

- a flat rate of about £275 per authorisation;
- a banded charge under which the charge for a site with 1-4, 5-9, or 10 or more authorisations would be of the order of £700, £1400 and £2500, respectively;
- a matrix related to the relative pollution potential of an industrial site and its size and complexity so as to reflect contribution to HMIP's workload. The number of authorisations granted for a site would be used to reflect its size and complexity. There would be three categories: small (1-4 authorisations), medium (5-9 authorisations); and large (10+ authorisations). Thus a large major polluter (eg an integrated iron works) would pay about £4000 pa, while a minor polluter (eg a small mineral works) would pay about £300 pa.
- and a graduated set of charges of £150 for each authorisation for a minor polluting process; £275 for each authorisation for a medium polluting process; and £350 for each authorisation for the most polluting processes.

Comments on the DoE's proposals *Cost Recovery Charging for Integrated Pollution Control* have to be submitted by 1 August.

RIMNET LAUNCH

Phase 1 of the Government's radiation monitoring and information system was launched in March. RIMNET forms part of the Government's National Response Plan for dealing with any future overseas nuclear incidents.

Under Phase 1 of the RIMNET project, radiation monitors have been set up at 46 Meteorological Office sites across the country and will be read regularly throughout the day by meteorological observers. The results will be fed into a computer, the Central Database Facility. This will raise an alert if any abnormal rises in radiation levels are detected.

In this event, a Technical Co-Ordination Centre will be set up to co-ordinate the national response. Members of the Co-ordination Centre will include representatives from Government departments, the National Radiological Protection Board and the Meteorological Office. If an incident occurs additional government monitoring programmes will be activated as necessary. These will cover food, water and people and goods coming into the country from affected areas abroad. Results from these programmes will be used along with the RIMNET data to assess the effects of the incident. Information and advice will be issued to the press and to local authorities and other organisations using CEEFAX, Prestel and Telecom Gold electronic mail.

Under Phase 2 of the project, the number of RIMNET stations will be increased to between 80 and 90, monitoring facilities at the stations will be improved and automated, and central computer and communications facilities will be upgraded.

"RED LIST" AGREED

The Government has now considered the responses to its 1988 consultation paper on controlling inputs of the most dangerous substances to water. In a parliamentary answer, Environment Minister, Lord Caithness, said that it was the Government's intention to proceed with the proposal that discharges from prescribed processes should be controlled by her Majesty's Inspectorate of Pollution (HMIP) under the proposed new arrangements for integrated pollution control. Such discharges would be subject to a requirement, to be introduced progressively for existing plant, that the process should be operated according to the best available technology not entailing excessive costs with a view to minimising discharges of the most dangerous substances. Discharge consents would also have to ensure that strict environmental quality standards were met and maintained in the receiving waters, and the proposed National Rivers Authority would have to be satisfied that this was the case before consent could be granted by HMIP.

A priority "red list" of 23 dangerous substances has also been agreed; this comprises the following:

Mercury and its compounds
Cadmium and its compounds
Gamma-Hexachlorocyclohexane
DDT
Pentachlorophenol
Hexachlorobenzene
Hexachlorobutadiene
Aldrin
Dieldrin
Endrin
Polychlorinated Biphenyls
Dichlorvos
1,2-Dichloroethane
Trichlorobenzene
Atrazine
Simazine
Tributyltin compounds
Triphenyltin compounds
Trifluralin
Fenitrothion
Azinphos-methyl
Malathion
Endosulfan

The Government is of the view that existing powers and arrangements for controlling the supply, use and disposal of substances should be sufficient to deal with any potential pollution problems from diffuse sources, but this will remain under review. In the meantime more widespread environmental monitoring for priority substances has been initiated and the need for specific action where this proves necessary will be looked at case-by-case.

DTI ENVIRONMENT PROGRAMME

Environmental awareness as an integral part of good business practice is one of the reasons behind the launch of the Department of Trade and Industry's environmental programme.

Apart from raising environmental awareness within business, the programme aims to encourage the wider application of good working practices, promote waste minimisation and the efficient disposal of business waste, and help firms respond to market opportunities. The main components of the programme are an environmental enquiry point for business which has been established at Warren Spring Laboratory; advice on environmental issues through the Enterprise Initiative consultancies; a major campaign to improve waste management standards; and development of pollution control technology so that UK suppliers can take advantage of a world market estimated to be around £150 billion a year.

FARM POLLUTION UP

A record 4,141 cases of farm pollution of rivers in England and Wales was reported in 1988, a six per cent increase over 1987. However, of these only 148 led to prosecution and average fines amounted to less than £350, despite a maximum limit of £2000. The Water Authorities report *Water Pollution from Farm Waste 1988*, also reports that in the North West Water Region which had the highest number of reported incidents, 29 miles of river have been downgraded. South West Water with the second highest number of reported incidents records a 66 per cent increase in pollution from slurry stores.

Ministers are said to believe that the National Rivers Authority, to be established under the Water Bill, will provide a means of stricter pollution control. The NRA will it is hoped bring more prosecutions in the crown courts which can impose unlimited fines. Another possibility is to include more stringent powers in the expected "green bill".

OCCUPATIONAL EXPOSURE LIMITS

Guidance Note EH 40/89 from the Health and Safety Executive gives details of the occupational exposure limits which should be used for the purposes of determining the adequacy of the control of exposure by inhalation to substances hazardous to health. These limits form part of the requirements of the Control of Substances Hazardous to Health (COSHH) Regulations 1988 which comes into force on 1 October 1989. The regulations will affect all workplaces where substances are used which might harm the health of workers.

Further advice on COSHH can be obtained from the HSE, Broad Lane, Sheffield, S. Yorkshire.

CLEAN COAL ELECTRICITY

Britain's first power generator using "clean coal" technology is due to come on stream in 1991. The combined heat and power station is being installed by Slough Estates at its industrial estate in Slough and will use fluidised-bed burning technology giving an 80% energy efficiency level (compared with 37% for existing power stations). Coal is burnt in a bed of red-hot limestone, trapping more than 90% of the sulphur. High pressure jets of air keep the fuel particles circulating to ensure complete combustion. Slough Estates who have been lobbying for the right to feed electricity into the power supply network after privatisation, plan to offer up to 40 MW to the local grid.

CFCs TO GO BY 2000

Delegates from 80 countries meeting in Helsinki in May agreed to work towards the elimination of CFCs by the end of the century. The meeting was the first round in the review of the Montreal Protocol and will be followed up by a further meeting in London next year when a formal amendment to the Protocol is likely to be agreed. Much of the success in translating this "declaration of intent" into reality will however depend on developing countries being able to get hold of substitutes for use in refrigerators etc; at the UK Government/UNEP ozone conference in March developing countries said that for them to switch to expensive alternatives would require development aid from the industrialised nations. At the Conference in Helsinki the Norwegian Government confirmed its pledge to set aside 0.1% of its GNP (approximately £60m) for an "international climate fund" provided other industrialised countries agree to do the same. This was welcomed by UNEP Executive Director, Dr. Mostafa Tolba who told the conference that the transfer of technology, research and raising of public awareness would involve "large sums of money". However, the Governments of some industrialised countries, including Britain, are not keen on the idea of such a fund, preferring to work through existing aid agencies.

CFC RECOVERY

Preseli Pembrokeshire District Council has set up a special collection area for old fridges and freezers. The Council extracts the CFCs on site, compresses them into special pressurised containers for return to the manufacturers for safe disposal. The Council say the scheme has not cost much to set up and hope that such schemes will become widespread.

W. Germany is setting up a country-wide scheme for recovering CFCs from old fridges and freezers. Waste disposal authorities will be responsible for collecting the units from consumers which will be taken to central collection points where the CFCs will be removed. The scheme is expected to be free or only a nominal charge will be made.

OZONE VIDEO

The Heating and Ventilating Contractors' Association has published a seven-minute video film, "Safe in our hands" describing the measures being taken by the refrigeration and air conditioning industry to reduce its dependence on CFCs.

The film looks at the "Space" programme devised by HVCA member, Stanley Refrigeration, which involves regular leak testing, close monitoring of plant performance and recyling of used refrigerants. The video also features the research and development work carried out by Copeland Corporation on a product range based on R22 which it is said will be able to meet 99 per cent of British needs and help satisfy the world-wide demand for ozone friendly refrigeration equipment.

The video is available for purchase in VHS format, £23 inclusive of postage and VAT, from HVCA, 34 Palace Court, London W2 4JG.

GREENHOUSE RESEARCH

The CEGB is sponsoring a five year research programme which will explore four scientific issues critical to improving predictions of future climatic changes as a result of the greenhouse effect. Research will look at the absorption of carbon dioxide from the atmosphere by the ocean; the way heat is transferred from the warm surface of the ocean down into deeper waters; heat and water vapour transfer from the land to the atmosphere; and cloud characteristics and their effects on the climate.

The Building Research Establishment is carrying out research into the links between buildings and the greenhouse effect. Main elements of the programme will look at energy consumption and the use of CFC's in building products.

US GLOBAL WARMING BILL

A wide-ranging bill to enact a national energy policy has been introduced into the US Senate. The bill's sponsors see such a policy as being the key element in combatting global warming. The main clauses of the bill include

- setting tough goals to reduce greenhouse gases;
- promoting energy conservation;
- launching research initiatives to exploit solar and other renewable energies;
- enacting policies to preserve and rebuild tropical rain and other forests.

CALIFORNIAN CLEAN UP

For almost four months during 1988, ozone pollution in Los Angeles exceeded minimum government standards; and according to experts, children born and brought up there will grow up with 10-15% less lung capacity than children elsewhere.

Now stringent new controls to clean the air if approved could improve air quality and visibility over LA by between 10-70 miles; among the measures proposed are:

- cars to run on electric power or other "clean" technology by 2007; as an intermediate step government bodies, businesses, and car hire companies will have to switch to methanol or another "clean burning" fuel by 1992.
- elimination of free parking anywhere as soon as possible;
- within 5 years, a limit on the number of cars per family, a ban on petrol-driven lawn mowers and solid-fuel barbecues.

WASTE DIRECTIVE AGREED

At its meeting in March the EEC Environment Ministers reached agreement on the Directive on emissions from Municipal Waste incinerators. The Directive applies to new plant. Among its provisions are that carbon monoxide should be monitored on an hourly average basis; a particulate standard of 30 mg/m^3; incinerators with a capacity of less than 1 tonne/hour will be allowed a much looser particulate limit and the emission standard for hydrogen chloride will not apply. The Directive also specifies a minimum operating temperature of 850°C and residence time of two seconds. Negotiations are now in hand to try to agree the text of a second Directive relating to the upgrading of existing municipal incinerators to meet the new requirements.

EC WORK PROGRAMME

Among the Environmental initiatives expected from the European Commission in 1989 are proposals for a Community radiation inspectorate, an investigation relating to radon in the home, control of trans-frontier waste shipment and rules on the civil liability of waste producers. A report on the cost of neglecting the environment is also in the pipeline.

PCB AND PCT DISPOSAL

A draft Directive on the disposal of polychlorinated biphenyls (PCBs and polychlorinated terphenyls (PCTs) — COM(88) 559 final — has also been published. PCBs and PCTs are used in a variety of applications, such as components in paints, glues, lubricants, plastics and as dielectric and hydraulic fluids. Most PCBs and PCTs still in use are found in transformers, condensers and some hydraulic mining equipment. They are highly toxic when dispersed into the environment and can be carcinogenic when inhaled.

There are already two Directives; Directive 76/769/EEC limits their use in concentrations of over 1000 ppm to closed systems such as transformers; the second Directive — 76/403/EEC deals with the disposal of PCBs and PCTs. The proposed Directive will replace 76/403/EEC and generally tighten controls on disposal of used PCBs which can no longer be marketed in Member States.

"QUIETER" SHOTGUN

A North Yorkshire country landowner whose clay pigeon shoots were the subject of complaints from neighbours and at risk of being banned has helped develop a "quiet" shotgun. The gun, developed with the help of a specialist armourer, is claimed to be 50% quieter and uses cartridges containing nickel instead of lead shot, and biodegradable plastic wadding. Holes drilled along the barrel of the gun disperse the hot gases, reducing the explosion of the shot. Local environmental health officers have tested the gun and recommended to the Council that the shoots be allowed to continue for 12 months.

MOTORBIKE NOISE CONTROL

An EEC Directive agreed in March will enable Member States to ban the marketing and use, as from 1 October 1990, of replacement silencers on motorcycles which exceed the noise emission limits laid down for the original equipment by more than 3dB(A). Member States will also be able to introduce type-approval procedures for replacement exhaust systems and their components.

New regulations were introduced in the UK last year which require replacement silencers to be marked to show either that they are identical to the original or conform to the relevant British Standard.

In Derbyshire, police are carrying out roadside checks on motorcycle noise. A hand-held sound level meter is held half-a-metre from the rear of the exhaust at an angle of 45° and the engine run at half the total possible revs. If the exhaust noise exceeds 103dB, a vehicle rectification notice is issued which allows seven days for the repairs to be made.

BALANCED FLUE INVESTIGATION

The Department of the Environment has asked the Building Services Research and Information Association to investigate whether horizontal balanced flues, widely used in gas heating systems are a health hazard. Attention is focussing on whether adverse amounts of carbon monoxide and NOx can seep back into rooms through cracks in windows and doors.

INDUSTRIAL NEWS

LSS (SCIENTIFIC SERVICES)

LSS (Scientific Services), formerly the Scientific Services arm of the GLC, has now moved to new offices in London at Great Guildford House, 30 Great Guildford Street, London SE1 0ES. Telephone 01-962 9884.

In its first move towards offering a nationwide service, LSS (Scientific Services) has opened a regional office in Birmingham at King Edward House, New Street, Birmingham B2 4QJ. Telephone 021-632 4561.

Local services will cover building management support, including checking for, and designing systems to prevent outbreaks of legionella; land contamination studies — particularly relevant in the West Midlands where a lot of Black Country land needs thorough investigation before building projects can go ahead; and waste disposal and incineration advice. Other services to be offered from the Birmingham office include environmental assessments, noise and air pollution studies; and providing expert witnesses for litigation matters.

Reader Enquiry Service No. 8913

POLLUTION MEASURING BY LIGHT

A machine which measures air pollution via a beam of light is being used by Sheffield City Council at a school on a busy road to check on levels of pollution, which it is feared could harm the children's health. The Swedish-made OPSIS machine which is distributed in the UK by Enviro Technology, can detect several different pollutants simultaneously. A projector on the school's roof will give out a beam of light which will slice through the air above the traffic: each pollutant absorbs a specific wavelength of light and ignores the rest. The receiver, positioned about 20 metres away across the road from the school, registers how much light has been absorbed.

By comparing the wavelength of light absorbed with the information in its memory, the computer can identify which substances are present and the exact concentrations of each substance in the atmosphere. This information is displayed directly on a monitor giving an accurate and comprehensive picture of the air's composition.

Reader Enquiry Service No. 8914

NEW AEROSOL SYSTEM

A new aerosol system was announced by British Technology Group in early March. Developed by Atmosol Ltd of Harpenden, the Atmosol system uses a novel regulator in conjunction with environmentally acceptable gases, such as air or nitrogen, or soluble gases such as carbon dioxide, as propellants. The regulator is the only new piece of hardware replacing the conventional actuator, but does not require any change to existing containers, valves or dip tubes.

Reader Enquiry Service No. 8915

NOISE DESIGN SOFTWARE

WS Atkins Engineering Sciences has launched what they believe to be the first family of software for noise analysis and design.

RoadNoise is a system for calculation of road traffic noise; SiteNoise is a system for calculation of noise from construction and open sites.

The remaining two members of the family — airNoise for calculating noise "footprints" and contours around airports and ventNoise for noise control of heating and ventilating systems — are to be released soon. An internal acoustics design system is at the prototype stage.

It is easy to move between systems and users can share models between the siteNoise and roadNoise system.

WS Atkins Engineering Sciences expects its Noise family of software to raise the awareness of the need to deal with noise problems at the design stage.

Reader Enquiry Service No. 8916

DIESEL ALTERNATIVE

One of the major sources of complaint against diesel vehicles is their particulate emissions — these soil buildings and clothes, cause and exacerbate respiratory problems and reduce visibility; recent research also points to diesel emissions being carcinogenic.

In order to meet increasingly strict diesel emission standards, ICI have been carrying out tests using ignition-improved alcohols as diesel fuel. By adding a small volume of an ignition improver, lubricating agent and corrosion inhibitor in the form of a pre-formulated additive mixture, ethanol or methanol can be converted to diesel fuel. Neither are good diesel fuels on their own since they are difficult to ignite by compression heat alone.

Results of trials recently carried out using methanol and Avocet (a standard additive package developed by ICI) show significant reductions in emissions from diesel engined vehicles, with sulphur oxides eliminated, particulates virtually eliminated and nitrogen oxides much reduced. In most of the trials, a few or no operating problems have been encountered and although more expensive than diesel fuels, these should be offset by environmental and health benefits.

In conjunction with the South Coast Air Quality Management District of Los Angeles, ICI is now carrying out a major trial using methanol/Avocet in California. They hope to demonstrate that methanol/Avocet fuel provides a way of meeting the 1991 EPA emission limits for diesel-engined buses.

Reader Enquiry Service No. 8917

WATER MONITORING

An electronic sensor for detecting a wide range of river pollutants has been developed by British scientists and is currently on trial at the Water Research Centre in Oxfordshire. If the trials are successful it is hoped that the sensor will be installed by all waterboards; this would allow monitoring for pollutants and detection of the exact point that toxic chemicals enter the water without the need for on-site sampling. The sensor, which has been developed at the Centre for Applied Technology and Innovation, is claimed to be sensitive to herbicide levels as low as 50 parts per billion.

Reader Enquiry Service No. 8918

BOOKS & REPORTS

AEROSOL SAMPLING — SCIENCE AND PRACTICE

James H. Vincent. Publisher: John Wiley and Sons, 1989. £80.00. ISBN 0471 921750

Aimed at all those for whom aerosol sampling may be of interest — especially occupational, industrial and environmental hygienists. The first half provides a scientific framework of the processes of aerosol sampling; the second half deals with practice, thereby bridging the gap between the theoretical background to particle transport in gases and a practical guide to aerosol sampling.

Although the handbook will doubtless be of use to those concerned with atmospheric quality, at £80.00 it would seem to be beyond the reach of most, particularly as by the authors own admission "the book is already well on its way to becoming out-of-date".

CONTAMINATED LAND

Prepared by Aspinwall and Company Ltd on behalf of the Institution of Environmental Health Officers. ISBN 0900103 38 8. Price £15.00, from IEHO, Chadwick House, Rushworth Street, London SE1 0QT

Increasing pressure on land use has resulted in a growing need to develop land which has been contaminated through, for instance, having been used as a waste disposal site. The IEHO therefore commissioned Aspinwall and Co. to produce this practical guide for the assessment and redevelopment of contaminated land. It deals with legislative and administrative controls, assessment procedures, data interpretation and assessment, remedial treatment and monitoring, waste disposal and financial implications, including grants available for reclamation of derelict land.

HEAVY METALS AND PAH COMPOUNDS FROM MUNICIPAL INCINERATORS — ENVIRONMENTAL HEALTH 32

Publisher: World Health Organisation (WHO), 1989.

Report on the discussions and conclusions of a WHO Working Group meeting in Tuscany in October 1987, the second of two meetings called in response to concern at the potential danger of emissions of hazardous organic compounds from municipal waste incinerators. It focuses on materials and conditions of incinerators, environmental pathways of heavy metal and PAH Compounds, the relative importance of waste incineration compared with other forms of exposure and the public health significance of emissions. The report of the first meeting held in Naples, 1986, is also available from WHO.

COMPENDIUM OF REGULATORY AIR QUALITY SIMULATION MODELS

D.I. Szepesi. Publisher: Akademiai Kiado, 1989. £29.50. ISBN 963 0546752

The compendium includes 183 air quality simulation models by modellers from 27 countries, in response to an inquiry distributed by the World Meteorological Organisation. The information was analysed by D.I. Szepesi, to produce this volume enabling comparison of different approaches of simulation techniques. It is hoped that publication will be a step towards the standardisation of modelling, in a field where there are problems in unifying air quality modelling techniques and model parameters.

C FOR CHEMICALS — CHEMICAL HAZARDS AND HOW TO AVOID THEM

Michael Biskin and Brian Price. Publisher: Greenprint, 1989. £4.99. ISBN 1 85425 027 2

Another "green" consumer guide, covering the chemical content of household, garden and do-it-yourself products and car accessories. It is aimed at the average householder, with a glossary and list of hazardous chemicals and their properties. The book provides a guide to potential hazards in the domestic environment, listing products and materials and their harmful ingredients. However, by the authors own admission, product information is often scant and it is left up to the reader to assess the hazards of the actual products they purchase and to find alternatives. It will, however, be useful for alerting those previously unaware to the many toxic substances to which we are exposed in the home environment.

ENVIRONMENT AND HEALTH — A HOLISTIC APPROACH

Ed. Robert Krieps. Publisher: Avebury 1989. £25.00. ISBN 0566 070502

This book is a summary of the international symposium Man. . .Health. . .Environment in Luxembourg, March 1988 — a closing event of European Year of the Environment. The aim was to expose the relationship between human activity and problems of environment and health.

The book is divided into sections — the scientists, scientists and civilisation diseases, politics and politicians and the artists and philosophers. By bringing together international experts covering a wide range of fields, the overall aim is to show how damage to the environment cannot be isolated from damage to our minds and bodies, and therefore the dangers of a fragmentary approach to ecology.

ODOR CONTROL — INCLUDING HAZARDOUS/TOXIC ODORS

H.E. Hestreth and F.L. Cross. Publisher: Technomic Publishing A.G., 1989. SFr.58. ISBN 087762 6081

Covering odour sources, detection and control, this handbook aims to provide a practical guide to both industrial and municipal odour problems. It details techniques and equipment, as well as diffusion modelling, extending to both industrial and municipal problems.

FUTURE EVENTS

5 JULY — STRATEGIC PLANNING FOR THE CONTROL OF EMISSIONS FROM COMBUSTION PROCESSES — THE LATEST INFORMATION
One day conference, chaired by Sir Hugh Rossi MP, to review current and projected emission standards and potential European legislation.
Venue: The Gloucester Hotel, London SW7.
Details: Louise Marriott, IBC Technical Services Ltd. Tel: 01-236 4080.

9-22 JULY — INTERNATIONAL SEMINAR: ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT
Sponsored by the WHO and UNDP, the seminar will present a comprehensive introduction to the aims and scope of EIA, in the context of environmental management strategies. Methods and techniques which can be used to assess the impacts of proposed major development actions will be looked at.
Venue: University of Aberdeen.
Details: Centre for Environmental Management Planning. Tel: 0224-272480 Fax: 0224 487658.

11 JULY — ENVIRONMENTAL ASSESSMENT: ONE YEAR ON
One day seminar jointly organised by LSS and Rendel Planning reviewing environmental assessment procedures, the types of project that have been subject to EA, what is involved, how the regulations have worked and whether local authorities and developers are working together successfully.
Venue: Aston University Business School, Birmingham.
Details: Andrew Freeman, Rendel Planning. Tel: 021-236 7129.
Jane Laffan, LSS. Tel: 01-962 9884.

11-12 JULY — CONFERENCE: CARING FOR THE FUTURE
The objective is to promote a local government “green” perspective and a range of environmental policies.
Venue: Newcastle-upon-Tyne.
Details: Association of Metropolitan Authorities. Tel: 01-222-8100.

4-7 SEPTEMBER — PRACTICAL INDUSTRIAL NOISE CONTROL
A course focussing on the requirements of the EC Directive on Noise which comes into force on 1 January 1990, and UK regulations for the prevention of damage to hearing from noise at work.
Venue: Loughborough University of Technology.
Details: Miss Pat Stenhouse, Centre for Extension Studies. Tel: 0509 222161.

11-15 SEPTEMBER — 8th WORLD CLEAN AIR CONGRESS AND EXHIBITION

The central theme of the Congress is "Man and his Ecosystem", and lecture and poster sessions will include air quality in public buildings, the home and the car; emissions — air pollution control; acidification; integrated pollution control.
Venue: Congress Centre, The Hague.
Details: Netherlands Congress Centre, PO Box 82000, 2508 EA, The Hague, The Netherlands.

12-14 SEPTEMBER — FILTECH CONFERENCE

Conference organised by the Filtration Society, also exhibition of latest filtration and separation equipment.
Venue: Karlsruhe Congress Centre, Germany.
Details: The Filtration Society, c/o 7 Manor Close, Oadby, Leicester LE2 4FE.

13 SEPTEMBER: CONTROL OF DISCHARGES TO THE ENVIRONMENT

Venue: Loughborough University of Technology.
Details: Fiona Williamson, Institution of Chemical Engineers. Tel: 0788 78214.

2-5 OCTOBER — COURSE: AIR POLLUTION

An intensive short course dealing with atmospheric processes, monitoring instruments and strategies.
Venue: University of Essex.
Details: Dr. R.M. Harrison, Institute of Aerosol Science, University of Essex, Colchester CO4 3SQ.

23-26 OCTOBER — 56TH ANNUAL CONFERENCE OF NSCA

Sessions on the greenhouse effect, vehicle emission controls, indoor air pollution, noise, waste disposal and local action on green issues.
Venue: The Spa, Scarborough.
Details: NSCA. Tel: 0273 26313.

23-27 OCTOBER — ECOTECH 89

International waste processing, recycling and environmental management exhibition.
Venue: Exhibition Centre, Utrecht, Netherlands.
Details: Overseas Trade Show Agencies. Tel: 01-487-5831; Fax: 01-487-3480.

1990

3-5 APRIL — CONFERENCE: EFFLUENT TREATMENT AND WASTE DISPOSAL, LEEDS

Details: The Institute of Chemical Engineers, 165-171 Railway Terrace, Rugby CV21 3HQ.

6-8 JUNE — 16TH WORLD CONGRESS OF INTERNATIONAL ASSOCIATION AGAINST NOISE, BRIGHTON

Details: National Society for Clean Air, 136 North Street, Brighton BN1 1RG.

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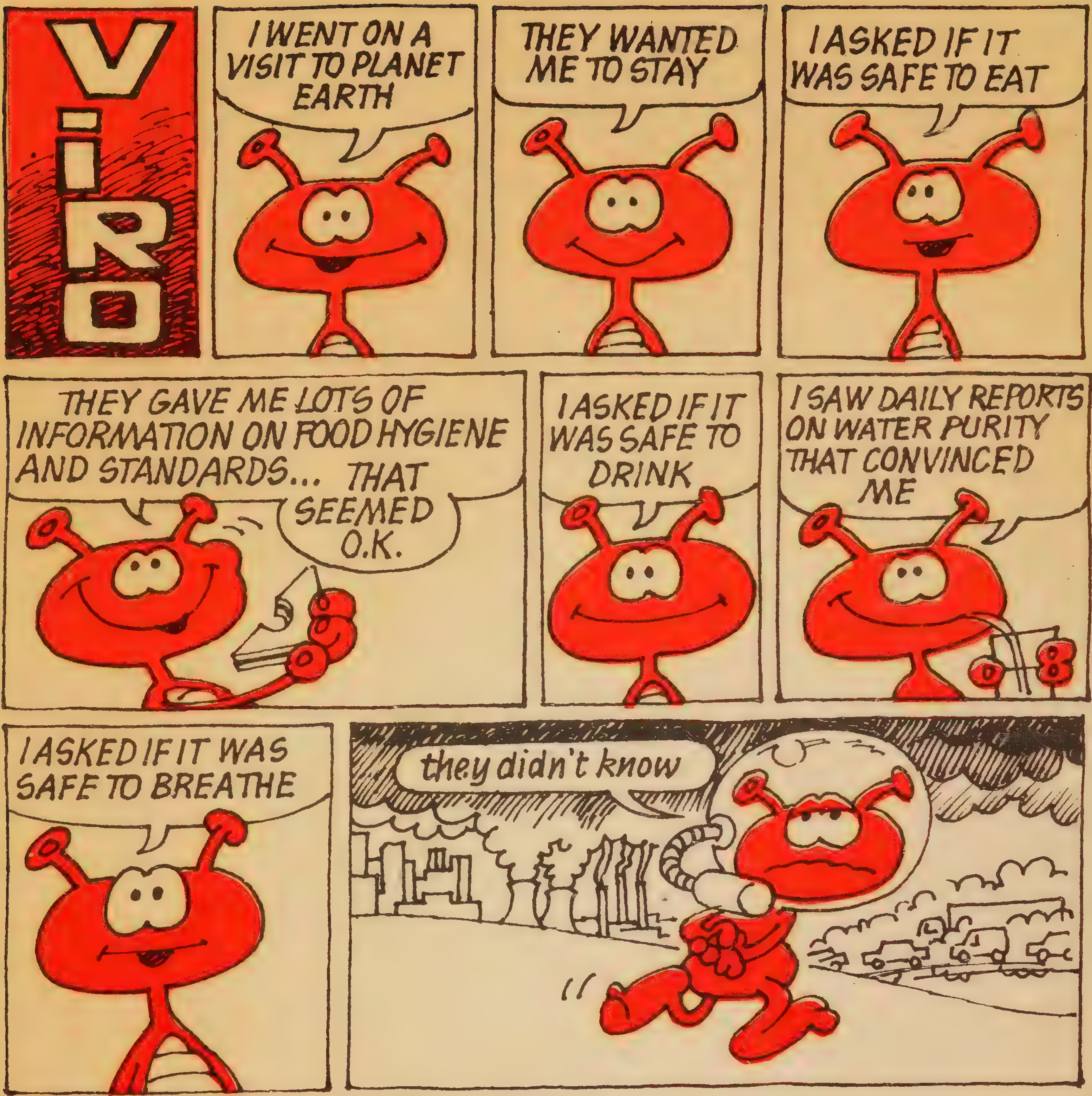
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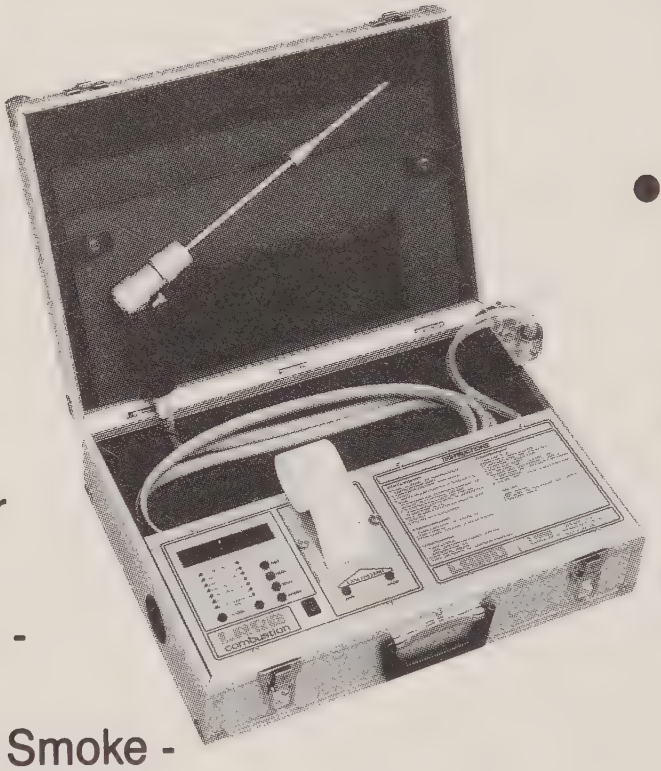

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EDITORIAL

WHAT'S GOING WRONG AT HMIP?

A paradoxical effect of the very public controversy surrounding water privatisation has been to ensure that the National Rivers Authority has been given the staff and resources it needs to fulfil its new regulatory duties in a credible fashion. We can only speculate about why Her Majesty's Inspectorate of Pollution has not been accorded similar treatment. The numbers speak for themselves: in 1976 — when there were 47 inspectors working on air pollution — the Royal Commission on Environmental Pollution called for the establishment of a single pollution inspectorate and considered that such a move would require doubling the strength of the then Alkali Inspectorate. Yet today, with HMIP in being, there are just 32 air inspectors on the front line. Furthermore the number of processes needing control has increased, technology has become more complex, and forthcoming plans for Integrated Pollution Control will ensure that for some years to some, possibly one third of inspectorate time will be taken up writing new authorisations.

The new Environment Minister Chris Patten inherits a Department which is strong on rhetoric but weak on action. On his accession, NSCA wrote outlining our views on priorities for environmental control. The bland assurances given in the reply from junior minister David Trippier (see this edition) do nothing to inspire confidence that the problems of HMIP are being taken seriously. And the recent low-key announcement by Mr. Trippier on the regional restructuring of HMIP fails to address the underlying crisis of confidence which the air inspectors are suffering.

The fact is, HMIP is short of staff and resources, and a recent attempt to recruit nine new air pollution inspectors resulted in just one appointment. This is clear evidence that the pay structure and career prospects on offer are insufficient to attract applicants with suitable expertise and qualifications. The NRA, by comparison, was given the resources and has been able to offer attractive conditions to its employees.

Some of the motivation behind recent calls for a European Environmental Protection Agency lies in the fact that enforcement of EC environmental legislation across Europe is patchy. The UK has a long and honourable tradition of industrial pollution control; we should be leading the rest of Europe by example, yet are bound on a course which is inevitably undermining the effectiveness of those who work at the sharp end.

We make no apologies for returning yet again to this subject for editorial comment. In another month we will know the Government's plans for the Environmental Protection ("Green") Bill. Good or bad, the ultimate legislation will remain toothless unless it is enforced by a team of professionals who command the respect both of industry and the public. There is an urgent need for an independent enquiry — by RCEP, or the Commons Select Committee on the Environment — into the staffing and organisation of HMIP. Whoever takes on such a task must build in to their enquiry team expertise from industry so that the most pertinent questions are addressed. They must quantify the number of qualified staff necessary to enforce the UK pollution control programme, and identify the conditions of service which will attract suitably qualified inspectors. Until then we can only offer our thanks and moral support to those who stay with the Inspectorate despite the diminishing rewards it offers.

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NSCA NEWS AND VIEWS

NSCA WELCOMES ENVIRONMENT MINISTER

At the request of the Council, NSCA Secretary General wrote to Christopher Patten MP, Secretary of State for the Environment on 4 August congratulating him on his appointment, but expressing concern that DoE as presently organised is unable to deal effectively with today's environmental problems. We thought that *Clean Air* readers would be interested in our letter and the reply from David Trippier MP, Minister for the Environment and Countryside, on which we comment in this issue's editorial.

Dear Secretary of State

The Council of the Society have asked me to send to you their congratulations on your appointment as Secretary of State and to wish you every possible success in meeting the formidable range of environmental problems which face us all.

With this in mind, they have also asked me to take this opportunity to express their deep and longstanding concern that your Department as presently organised is unable to lead on environmental issues as effectively as possible. In particular, they note that the key portfolios for the Environment and Energy are quite separate, whilst other responsibilities for the environment are fragmented in other Departments. In the light of this they see the need for the following:

— a comprehensive overhaul of the machinery of government for the protection of the environment to ensure that the co-ordinating authority — presumably the Department of the Environment — possesses the requisite authority and resources, and is appropriately structured,

— and the creation of a statutory, independent, non-political body to advise Government on all aspects of environment and pollution policy including, importantly, research and development.

With regard to the latter, they see the need to stimulate the development of environmental control technology — which has signally failed to receive the same backing from Government here as in, for example, Germany, Japan and the USA, all of which as a matter of principle have supported basic research long before the development of the technology which has emerged. Largely because of this, others are setting the standards to which the UK is now trying to catch up. In the UK there is no forum in which even to discuss such matters.

We would ask you, therefore, to see the arrangements for the overall development of national environment policy and its co-ordination between Ministries as a first priority task. Should you find it helpful, we would be delighted to discuss this with you personally or with your officials.

Yours sincerely
John Langston *(signed)*

Dear Air Commodore Langston

Thank you for your letter of 4 August to Christopher Patten about the organisation of this Department and the lead we give on environmental issues.

In the last year or so, there has been an increasing and sustained interest in environmental issues. This higher profile not only heightens the public's awareness of the Government's long-standing commitment to protecting the environment; it also sharpens interest in what people can do for themselves — like deciding to use unleaded petrol, avoiding (where practicable) products containing CFCs, and becoming more litter conscious and energy efficient. In contrast, some of the issues which present the greatest challenge also require international collaboration and solution on a global scale. The Government has taken the lead on several important environmental matters, including calling for a framework global convention on climate change.

I can appreciate your concern that with more than one Government department holding an interest in environmental issues co-ordination may become a problem. In fact this Department maintains regular contact with all its Governmental colleagues, both on a formal and informal basis. You suggested the creation of an independent body to advise Government. This already exists, in the form of the Royal Commission on Environmental Pollution, which was set up in 1970 to provide authoritative independent advice on all matters relating to pollution. Its reports are very valuable.

You also mention the need to stimulate environmental control technology. We are entirely in agreement. That is why we have established the Environmental Protection Technology scheme (EPT).

This scheme aims to encourage technical innovation in the field of environmental protection leading to higher standards and a more dynamic UK pollution abatement industry. The scheme identified seven priority areas where the Department foresees a need for higher standards. These include: reducing emissions from municipal incinerators, odour control, heavy metals in industrial waste-water, organic compounds in industrial waste-water, reducing emissions of CFCs and halons, reducing emissions from use of volatile organic compounds in industry, and on-site treatment of contaminated soils. The scheme offers grant aid of up to 50% towards the cost of taking innovative ideas forward.

I hope I can assure you that the Government appreciate fully the importance of controlling pollution, and the need to keep pollution control in the forefront of our policies and where possible to streamline our practices and make them more effective. I am confident that the measures we are taking will keep us in the lead on international action on the environment.

Yours sincerely
David Trippier *(signed)*

NSCA COMMENT

COST RECOVERY CHARGING FOR INTEGRATED POLLUTION CONTROL

Earlier this year the Department of Environment published proposals for recovering 70-75% of HM Inspectorate of Pollution's total expenditure in relation to integrated pollution control. The charging system proposed would cover the costs of HMIP granting integrated authorisations, their sampling, inspection and enforcement work and the administrative work in the regions in support of these functions. It is proposed to levy a combination of an initial charge for authorisations plus an annual charge for all scheduled industrial sites. NSCA is unhappy with both the detail of the paper and its philosophical basis. NSCA's submission to DoE is reproduced below.

Introduction

NSCA views the document more as a statement of intent rather than one of true consultation, and has important objections to some aspects of the proposals — notably the concept of relating charges directly to the activities of HMIP and the enforcement process. The Society has no objection in principle to the concept of charging for *authorisations* and *consents.* The quoted examples of charges for environmental regulation — licences to dump waste at sea and applications for planning permission and building regulations consent — represent a similar type of one-off fee payable at the commencement of operations.

However the Society considers it ethically wrong for industry to be charged for *policing* by the policeman; particularly as the Inspectorate has only recently lost its reputation for having a "cosy relationship" with industry which had attracted criticism in the past. The new proposal would be equally open to abuse and similar criticism. Should the proposal go forward unchallenged it could create a precedent for other such policing activities to be charged. Moreover, the consultation document states that Government policy is that charges should be levied where a public service is provided for "identifiable direct recipients". It is the public at large which benefit from the enforcement activities of HMIP, not the emitter. The proposals do not therefore fall within the scope of Government policy as stated in the consultation paper.

It is further questionable whether the amount of effort put into setting up and administering a charging system would ever be fully recovered. However, on the assumption that some sort of charging system seems inevitable, the Society has the following detailed comments.

Environmental Monitoring

HMIP's sampling work is directly related to monitoring firms' discharges and is included in the charges. NSCA considers that HMIP should also be involved in wider environmental monitoring, in co-operation with local authorities who take major responsibility for the monitoring process. In practice, HMIP currently undertake very little routine monitoring. It is the view of the Society that monitoring charges should reflect all environmental considerations; if HMIP are to charge for monitoring, LAs should also be compensated for the monitoring that they undertake.

Preparation of BPM/BATNEEC Notes

NSCA concurs with the view that the preparation of BPM/BATNEEC guidance is essentially part of the regulatory process and should be excluded from any charging regime.

Basic Form of Charging System

Three options are put forward for consideration:

- A once-and-for-all charge for each application for a new authorisation.
- An annual charge on all authorised processes or sites with authorised processes on them.
- A once-and-for-all charge for each application for a new authorisation plus an annual charge for all sites on which there are authorised processes.

NSCA considers that any system of charges is likely to be a deterrent to good relationships between HMIP and industry. Industrialists look to HMIP for advice about pollution control and process modification; the prospect of being charged more as HMIP involvement increases would discourage industry from making use of the very special knowledge and experience which HMIP can bring to bear.

The concept that the whole of HMIP's chargeable costs (over £3m) could be recovered from new authorisations and/or annual charges in an equitable fashion, does not bear close examination. The three options outlined serve to indicate the impossibility of devising any one charging structure which could apportion charges on an appropriate basis. This point is considered further. The documented reasoning for rejecting a one-off charge for applications for new authorisations is not accepted. If charging is inevitable, the Society would prefer a one-off charge, but regard it as unreasonable to expect such a charge to meet a given proportion of HMIP's annual running costs.

Charges for Applications for New Authorisations

The Government considers that a flat rate charge for each application for a new authorisation would not necessarily reflect HMIP's workload, nor the size of the process and the firm's ability to pay; it favours a graduated charging system linked to indicators of HMIP's workload required to grant the authorisation.

NSCA notes that the proposals for graduated charging systems base the criteria for charging on size and ability to pay; however, it is well known that a significant proportion of HMIP resources is taken up with small inefficient operators or with those works which, for historical reasons, are poorly located close to the community. The size of the plant is not necessarily related to the demand made on the Inspectorate; the proposition that large plant take up more time than, say, small complex chemical plant is patently incorrect. Any system which requires the big and/or efficient to subsidise the remainder would be fundamentally unfair and contrary to stated Government fiscal policy.

Furthermore, any plant which is subject to local concern or protest could require considerably more monitoring by HMIP than would normally be thought necessary (often such concern is related to occasional pollution events rather than persistently polluting emissions). How would such a plant be required to meet the bill?

Such anomalies serve to reinforce the view that it would be virtually impossible to design a fair charging system based simply on the level of direct HMIP involvement.

General

NSCA is committed to the Polluter Pays Principle — but the important question is how to determine the costs which the Polluter must bear, and how these might best be paid. It is the view of the Society that the models proposed in the consultation paper are not the most appropriate. Charging could undermine the credibility of HMIP and sour its working relationship with industry. The whole process of administering a charging system would place an extra burden on the pollution Inspectors and, crucially, would further reduce their ability to concentrate on the application of the specialist skills for which they have been — at least up to the present day — renowned.

If a “pollution tax” is to be raised to support and extend the work of HMIP and pollution control in general — and NSCA has no quibble with the overall concept — then a wider view must be taken. The Dutch approach of funding enforcement through special levies on fuel, for instance, would appear to be straightforward, in line with the polluter pays principle, and serves broader environmental objectives. A formula which equates pollution emissions with overall resource use would perhaps be more apposite.

An alternative charging system could be based on a calculation of the actual emissions of particular pollutants — a concept raised by DoE advisor Prof. David Pearce in the recent report *“The Implications of Sustainable Development for Resource Accounting, Project Appraisal and Integrative Environmental Policy”.* Equally, a case can be made for the work of HMIP to continue to be borne by the taxpayer/consumer, and that a pollution tax should be levied in support of more general environmental objectives. If industry is to pay more directly for the pollution it produces, the present consultation paper fails to propose a workable system.

The paper produces no evidence to show that charges would improve the resources available to the Inspectorate — or to local authorities — and hence improve pollution control. Nor is there a firm commitment that the money collected will be ploughed back into more general pollution control. Finally, there is no obvious way of introducing a charging system which would equitably balance the competing variables of Inspectorate time, the polluting potential of a process, the size of a process, and an industry’s ability to pay.

The recent Pearce report has thrown into question the way in which environmental costs and benefits are apportioned. The polluter must pay, but in the final analysis one has to ask — does this consultation paper really represent the most sensible way forward? We conclude that it does not.

DIESEL UPDATE

NSCA's report *Dirty Diesels* published in March showed just how serious the problem of diesel smoke emissions is. Since the report was published there has been more evidence from the US National Institute for Occupational Safety and Health (NIOSH) about the potentially carcinogenic nature of diesel fumes. Following the recent EEC agreements on car emissions, the relative importance of heavy-duty diesel emissions will increase. A recent report from Warren Spring Laboratory states: "Heavy duty diesel emissions will become the predominant source of highway NO_X and THC [hydrocarbon] emissions once all future car emissions regulations are in place and this is rapidly becoming a key issue in determining future UK Government policy for emission controls on these vehicles".

There are two major issues. One is the control of smoking vehicles already on the road. Following our report, NSCA received a letter from the Home Office confirming that the police will only prosecute smoky diesels if they are belching so much black smoke as to be a road safety danger. Their view is that Environmental Health Departments are responsible for controlling air pollution. EHOs would dispute that this is their responsibility. The NSCA position is that EHOs have no relevant powers, and a legal loophole allows smoking diesel vehicles to escape control. We believe that the police should be able to issue vehicle rectification notices to any vehicle producing visible smoke. It is nonsensical that, in a climate of tightening vehicle emission controls, smoking diesels are escaping control at the moment.

The second issue is improving emission standards for new vehicles. The European Commission is preparing proposals to tighten emission standards for big diesels. We understand that the major European diesel engine manufacturers have formed a co-operative consortium in order to develop new engines which will meet tough new emission standards.

NSCA believes that the UK government should be pressing for the tightest possible standards for both gaseous and particulate emissions, equivalent to the US 1994 standards. Whilst these may be difficult to meet with existing technology — particularly in the case of particulates — it is reasonable to assume that the research and development which is already being undertaken by manufacturers in order to meet the US 1994 standards will enable European manufacturers to meet similar standards by 1995.

STRAW AND STUBBLE BURNING

Once again the skies above southeastern Britain have been blackened by the annual stubble burn, and 1989 appears to have been a particularly bad year. NSCA's report on the 1988 burn, brought out to coincide with the start of the '89 harvest, sparked off considerable debate in the press by pointing out the contribution which burning makes to longer-range air pollution problems. The dangers of dealing with the new "environmentally aware" press were exemplified by the *Today* newspaper which reported our survey beneath the headline "Britain's Killer Carbon Shame"! Perhaps we should have anticipated that such information might be taken out of context; the main issue remains the local menace of smoke, smut, smell and ash which stubble burning creates, and this summer the NSCA office was inundated with calls from angry victims — householders, motorists and pilots — of stubble fires. Sustained pressure resulted in appeals to farmers not to burn, from both the NFU president Simon Gourlay and MAFF junior minister David Maclean.

We trust that our survey of the 1989 burn will provide the evidence that will finally lead to a complete ban on the practice — a view echoed by the Royal Commission on Environmental Pollution who have urged the Government to set a date for a legislative ban on the practice.

We shall also be looking at the wider question of burning on agricultural land, which appears to escape control under the *Clean Air Act 1968.* This is a campaign which we must now be very close to winning.

CLAY PIGEON SHOOTING

NSCA has submitted comments to the Department of the Environment on the revised draft code of practice on clay pigeon shooting prepared by the Clay Pigeon Shooting Association. NSCA is still concerned that the draft Code will offer inadequate protection to those living in affected areas, and has commented in detail on the sections relating to noise contours. Here NSCA points out that rather than give a guideline for separation distances (the original CPSA code suggested 750m, NSCA recommended 1500m), CPSA is now recommending that no shooting should take place anywhere a noise level of 60dB(A) is achieved at the boundaries of noise-sensitive premises.

While NSCA considers that this "noise contour" approach could prove to be an effective means of control, it foresees two problems. First, the omission of recommended distances from noise-sensitive areas will cause problems when considering new sites for which noise levels cannot be obtained. One local authority with experience of clay pigeon shoots suggests that levels of 60dB(A) will be heard at distances of up to 1800m during conditions when there is little contribution from wind direction. As a failsafe, therefore, NSCA recommends that minimum distances continue to be specified, and would suggest 1500m as a practical minimum for any site used on a regular basis. Any proposed shooting activity falling within this minimum should, in addition, be able to meet the "noise contour" criteria.

NSCA is also concerned that the "noise contour" approach fails to take into account the effect of background noise. A level of 60dB(A) will be perceived very differently according to the ambient noise level. A code prepared by the Midlands Joint Advisory Council for Clean Air and Noise Control uses a "2-track" rating based on the background L90dB(A) level, measured over 15 minutes. While this might prove a helpful approach, it must be borne in mind that other variables will prove of equal importance in determining the final annoyance factor. Ultimately, the use of a fixed noise level or separation distance alone will not necessarily achieve the degree of control required.

A full copy of NSCA's comments is available from Tim Brown at the NSCA.

INFORMATION REQUESTS SET TO DOUBLE

By the end of June 1989, NSCA's Information Department (three people) had already received more requests for information than for the whole of 1988. Over 2,500 letters have been received as against 2,400 for the whole of last year. A substantial number of letters are from school children wanting information for projects both at GCSE level and below, and often these requests can be dealt with through one of our leaflets; however many of the children also ask more detailed questions which show both a genuine concern for the environment and the problems caused by pollution. The Information Department also handles some 50-75 telephone enquiries each week many of them requesting help in coping with a specific environmental problem: noisy neighbours, bonfires and — during this summer — a steady stream of calls from people complaining about straw and stubble burning.

DIVISIONAL AGMs

NSCA Chairman Bill Snow together with the Secretary General attended the **London and South East and Central Divisions'** AGM held at the London HQ of British Coal on 14 June. Mrs. Pat Naylor was elected Chairman and Paul Cooney and Joseph Beagle re-elected Deputy Chairman and Hon. Secretary respectively.

The Hon. Secretary reports that the year has been one of quiet and steady progress and membership of both the divisions has been well maintained. There has been an increase of over 100 individual members of whom 26 are Life Members which is indicative of the interest shown in the work of the Society, and is in addition to the loyal support of the Sustaining, Corporate and Local Authority members.

After the AGM there was a meeting addressed by Dr. Jean Monro, Medical Director of the Breakspear Hospital for Allergy and Environmental Medicine, Abbots Langley on indoor air quality, the work of the hospital and the treatment of allergies caused by adverse environmental conditions. This branch of medicine is relatively new and is becoming increasingly important in establishing the causes of illness rather than just diagnosis and treatment. Dr. Monro has now been co-opted on to the divisional Council.

Bill Snow also joined 41 members of the **Northern Division** for the AGM held at the offices of British Steel in Redcar on 16 June. Members paid tribute to Charles Robson who retired as Hon. Secretary after six years during which the Division's activities have continued to develop and expand. Members re-elected Councillor Len Poole as Chairman and Mr. Keith Atkinson was elected Hon. Secretary and Treasurer. Following lunch, British Steel gave the members a guided tour of the works.

EAST MIDLANDS DIVISION

Any resident of the counties or shires of Cambridge, Derby, Leicester, Lincoln, Nottingham and Northampton with an interest in the environment and desire to spend time in congenial company, whilst learning of the most up-to-date developments in the many fields of pollution control, could do much worse than join the East Midlands Division of the NSCA.

This Division pursues an active programme of meetings and visits which cover a wide range of pollution related issues. For instance, following their Annual General Meeting in May this year, members of the Division were told of the work of the Gledthorpe Experimental Husbandry Farm, and during the afternoon visit were shown round the farm where they were informed of the results of work to investigate nitrate leachate and where they were able to see how odour from poultry houses can be controlled.

By way of contrast, the Autumn meeting of the Division included a detailed presentation on the Rolls Royce aero engine test facilities at Hucknall, and in the afternoon a visit to the Hucknall site. There, having seen how the Company reduce noise and air pollution emissions from modern engines members were thrilled by the sight and sound of the Rolls Royce Spitfire as it performed a low level fly-past and Victory Roll in their honour.

Of course this level of activity takes a great deal of organisation and here the Division has been most fortunate in its Honorary Secretary/Treasurer, Eric Raven. Eric, who served the Division in this capacity for the past 18 years stood down from the post at the Annual General Meeting shortly before his retirement as Derby City Council's Assistant Director of Environmental Services.

The new Honorary Secretary/Treasurer, David Romaine, who approaches his task with some trepidation, joins with the rest of the Division in thanking Eric for all his efforts on behalf of the Society and in wishing him and his wife Judith a long and happy retirement.

Eric Raven, (second from right), who retired as Honorary Secretary of the East Midland Division, pictured with (from left), Frank Haynes MP, Ken Enderby, Cllr. Eric Carter (Chairman of Mansfield DC), Bill Snow and Dr. D. Davies.

PCB MONITORING

In September NSCA wrote to Torfaen Borough Council, expressing its concern about the injunction obtained against TBC by Rechem International Ltd., on two points. First, the injunction prohibited the Council from publishing its "Presentation to the Secretary of State for Wales on the operations of Rechem International Ltd., and the need for a Public Enquiry"; this report had already been widely reported in the Press and NSCA felt that its findings were clearly a matter of considerable public interest and that Rechem's action could only raise questions about their motives in seeking to prevent further scrutiny of the date.

Secondly, the injunction prohibited monitoring under S.79 of the Control of Pollution Act 1974. However, as a Waste Disposal Authority, TBC has a duty under S.9 of the Act to monitor the Rechem site in order to determine whether it is complying with the provisions of its waste disposal licence and ensuring that activity on the site does not "cause pollution of water or danger to public health". NSCA felt that the terms of the injunction therefore appeared to prevent the Council from lawfully undertaking what is a statutory duty. In a recent out-of-court settlement, Rechem agreed to lift its injunction and Torfaen B.C. agreed to share any samples collected for monitoring with the plant. It is, of course, to be welcomed that Torfaen B.C. and Rechem have settled their differences. However, the settlement out-of-court still leaves a point of law unclarified – namely the extent of the duty of a waste disposal authority to carry out environmental monitoring in its area under S.9 and S.79 of COPA.

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VIEWPOINT

VALUING THE ENVIRONMENT

Environmentalists and economists have long recognised the problem of measuring the costs and benefits of pollution control. How can the economic cost of pollution control technologies and strategies be equated with the less tangible benefits to society and the ecosystem which pollution reduction brings? Everyone accepts that the polluter should pay — but who is really polluting, and how much should they be paying? In its response to the recent Department of Environment discussion paper *Cost Recovery Charging for Integrated Pollution Control* (see this issue), NSCA has argued for a complete review of the means by which the "polluter pays principle" is invoked in UK legislation. As a contribution to the discussion, we reproduce below two articles. One is a summary of the recent report by Prof. David Pearce, commissioned by DoE, on the economics of environmental protection and sustainable development. The report entitled *The Implications of Sustainable Development for Resource Accounting, Project Appraisal and Integrative Environmental Policy* was published on 14 September by Earthscan, (£6.95) as *Blueprint for a Green Economy.* The second, by Patrick Foley of Lloyds Bank, explores the concept of pollution taxation. We would welcome comments from *Clean Air* readers on this important subject.

BLUEPRINT FOR A GREEN ECONOMY

A Summary
by
Professor David Pearce

What is Sustainable Development?

The Brundtland report [*Our Common Future*, 1987, written by the United Nations' World Commission on Environment and Development chaired by Gro Harlem Brundtland, the Norwegian prime minister] defines it as: development that meets the needs of the present without compromising the ability of future generations to meet their own needs. There is an economic interpretation of the Brundtland definition: the well-being of today's generation should not be increased at the expense of future generations.

In order to ensure sustainable development, it is necessary to pay attention to economic efficiency and fairness (equity), both within a generation and between generations. We offer no formal proof here, but it can be shown that both of these objectives can be achieved by ensuring that the next generation has at least the same productive potential as this generation.

This requirement can be formalised as follows: this generation should ensure that it passes on to the next generation a stock of assets no less than the stock it has inherited. The assets in question comprise all forms of capital. We must learn to recognise that *environmental capital* is just as much capital as *man-made capital.* Environmental capital includes not just the stock of oil and gas, coal and minerals. It also includes the ozone layer, the protective functions of forests and wetlands, the waste-assimilating functions of rivers and oceans, and the store of biological diversity. To ensure sustainable development, we must "maintain the capital stock". In the Prime Minister's words, we need to maintain a *full repairing lease.* As long as the total of the capital stock is maintained, we may wish to reduce the stock of environmental assets in favour of building up the stock of machines and infrastructure, human skills and knowledge.

This idea of *trading off* environmental and other capital is not readily accepted by conservationists. The Brundtland Commission advanced the idea that it is not necessary to trade off environment and development. This view is probably too simplistic. We must expect to face the trade offs. But there are major qualifications to be made to the idea that we can run down environmental capital as long as we increase man-made capital and human skills:

- All too often, we run down environmental assets *without* compensating through increased amounts of other capital. We "live off our capital".
- Some forms of environmental assets are not readily substituted by other forms of capital. The store of bio-diversity is an example, as is the ozone layer. For these resources there must be a "safe minimum standard": an amount and quality below which we agree we should not go.
- If we must "trade off" the various types of capital — if we cannot have environment *and* development — it is vitally important to value the environmental assets correctly.

Subject to these very important observations, sustainable development does not mean zero economic growth. It means growth within the bounds set by the need to maintain "critical" environmental capital and it means a change in the *way* we grow.

Sustainable Development and Project Appraisal

The issue of valuation is crucial. A completely free market economy — an "unfettered" market — treats many environmental resources as if they have zero prices. Like any free goods, these resources are then abused and overused. It is therefore important to "price the environment" as far as we can. Otherwise we cannot make an informed judgement about what it is we are trading off.

Self-evidently, monetary valuation has limits. If it is judged inappropriate or infeasible then it is very important to describe and measure environmental impacts in as much detail as possible. This means that environmental impact assessment is of fundamental importance. But it needs to be allied more to the need to get some idea of the social importance of the different environmental impacts.

The second issue in project appraisal is the discounting problem. High discount rates appear not to favour the environment — think of the forestry problem. (Planting of a forestry looks economically unattractive because by the time the trees are ready to cut down 30 years have passed. This discount rate — which reflects the fact that money now is worth more than money in the future — used by the private sector makes it unviable. The Forestry Commission has to work on a discount rate of 3 or 4 per cent, less than the Treasury's rate of 5 per cent for public sector projects). They also seem to play down issues of public concern — think of nuclear waste disposal (where this generation has been lax in finding safe, long-term methods of nuclear disposal to benefit the next because the high cost now appears to outweigh the high benefit many years hence).

Should the discount rate be lowered because of environmental concerns? Should there be two discount rates, one for "ordinary" projects, one for "environmental" projects? The issue is not easily resolved.

We suggest we do *not* try to change discount rates because of environmental considerations. This is partly because the lowering of discount rates can have environmentally counterproductive effects.

It is also possible that we can find ways of adjusting project appraisal to reflect the need to maintain environmental capital, perhaps by imposing such a constraint on the *overall* set of investments undertaken by government or by a single agency.

Pricing and Economic Instruments

Unfettered free markets will not solve environmental problems. They will make them worse. But the market is a powerful means of modifying consumption and production patterns to make them environmentally more benign. To do this it is necessary to ensure that prices reflect the value of the environmental services used up in the production of goods and services.

One important reason for rethinking the nature of environmental policy instruments is that future environmental policy is going to be more expensive than past environmental policy. Past policy has not been very expensive at perhaps 1.25 to 1.65 per cent of GNP.

Future policy may be more expensive as we face up to controls on acid rain, vehicle exhausts and, perhaps, the problems associated with global warming. We need to utilise cost-effective protective measures, which points to the use of taxes and charges and the use of marketable emission permits.

Monitoring Economic Progress

The links between the workings of the economy and the natural environment are pervasive and frequently very important. Yet we continue to measure economic progress by concepts such as GNP without reference to environmental impacts. Countries frequently produce statistics that enable some sort of picture of the "state of the environment" to be obtained.

There is a vital and urgent need to *integrate* environmental impacts into our measures of economic progress.

- We could *modify the national accounts* and publish an "environmentally adjusted" GNP. One country — Germany — plans to do this officially. Another — Japan — has issued modified GNP figures, but unofficially.

The adjustments needed are: deducting expenditures undertaken by people and firms aimed at avoiding or mitigating environmental damage (defensive expenditures); deducting any residual damage remaining; deducting from Gross National Product not only the depreciation on man-made capital, but also the depreciation of environmental assets.

Issuing modified national accounts should be undertaken only if there is a high benefit relative to the cost. For the moment, we do not recommend such a venture. But we do recommend further investigation of the "netting out" of depreciation of natural capital. The end result is an estimate of *sustainable income*: it corresponds to the level of income we can enjoy without running down our overall stock of capital. It is thus wholly consistent with the definition of sustainable development.

- We could publish *satellite accounts*. They would show the physical "state of the environment" and the changes in stocks and flows of the resources over the year. But on cost-effectiveness grounds we do not recommend preparation of accounts along these lines.
- Exisiting *environmental statistics* could be integrated with economic statistics. This could involve extending the analysis in the Department of the Environment's annual abstract of statistics or devising a new "state of the environment" annual report in which environmental trends are related as closely as possible to changes in the economy. We recommend such a development.

Conclusion

The United Kingdom has espoused the philosophy of sustainable development. Sustainable development means passing on to the next generation a non-declining stock of capital assets. But embracing sustainable development means actively raising the profile of the environment in policy-making in *all* sectors of the economy.

Sustainable development means changing the signals given to economic decision-makers: from politician and civil servant to minister, from industrialist to consumer. Changing signals means changing prices and *using the market*. It does not mean leaving the environment to market forces.

The approach to project appraisal needs to be modified. Projects must be appraised in light of the fact that the environment clearly matters more than the weight placed on it in the past. The pursuit of sustainable development means monitoring economic progress in a different way.

The economy affects the environment and vice versa. This two-way process must be monitored through integrated environmental and economic statistics, and by measuring sustainable income.

BEING ECONOMICAL WITH THE ENVIRONMENT

by
Patrick Foley

Deputy Chief Economic Adviser
Lloyds Bank

All around the world, the environment, and its protection, are the topics of the moment. Public awareness of environmental issues has grown significantly. Politicians of every persuasion have suddenly become friends of the environment. Green parties are winning an increasing share of votes. Publications on environmental issues abound.

The environment is now widely recognised as a scarce resource. Since economic science is devoted to the study of the efficient use of scarce resources, it is logical to ask what contribution it can make to solving some of the environmental problems we now face. In contrast to their disagreements in other fields, there is almost universal agreement among economists about the appropriate policy response to environmental concerns. This article outlines the economic theory of environmental policy, and suggests an application of this theory to current issues.

Environmental Economics

Most environmental problems arise from what are known in economics as 'externalities'. An externality occurs when the actions of one or more people have real effects on some third party, without these effects influencing the action. One man burning his garden waste may reduce the benefit his neighbour gets from relaxing in the garden. Typically, externalities only persist when large numbers of individuals either create the externality, or suffer from it. In the above example, the two neighbours may be able to negotiate with each other a suitable time, or wind direction, for bonfires. An example of a persistent externality might be a coal-burning power station emitting sulphur dioxide into the atmosphere. The sulphur dioxide creates acid rain, affecting a wide area and many people. But the cost of this pollution is not taken into account by the power station in its calculations.

In pollution cases, therefore, externalities occur because those polluting take no, or limited, account of the cost of their action for others. This will generally result in the output of polluting industries being higher than is optimal. In other words, failure to take account of the cost of use of a scarce resource (the environment) results in market distortions. The market distortions take the form of sub-optimal production techniques and spending patterns. Were potential polluters forced to pay for any external effects, they might choose another production process, using a different mix of labour and capital and economising on their pollution emission. At the same time, if the resultant prices of their products rise, the effect would be to switch consumer demand away from such products.

The cure for market distortion is, therefore, to make the polluters pay the cost of their pollution, measured by the damage caused or by the cost of cleaning up. The most straightforward way of accomplishing this is to impose a tax on polluters, related to the amount of pollution generated for each unit of output. While it is often the case that taxes create market distortions, and therefore reduce efficiency, this is an example of a tax which corrects market distortion.

Taxation Versus Regulation

Pollution taxes are not the only way to shift production techniques towards those which make optimum use of all, including environmental, resources. Theoretically, direct regulation of industry, for instance by rules governing levels of pollution emission, could achieve the same result. However, regulation is unlikely to be as efficient as a tax. The OECD reported in 1985 that '. . .the cost of using economic incentives [ie taxes or charges] varies from 10 to 60 per cent of the cost of the specified physical alternative [ie regulatory standards]'. Taxes encourage those with low pollution abatement costs to cut emissions, whilst not forcing the same on those with high abatement costs, thereby minimising the cost of pollution reduction. They also provide an on-going incentive to polluters to research ways of reducing pollution, unlike a regulatory standard which simply requires polluters to achieve a given level of emission.

Another alternative is a system of marketable 'pollution rights', already being used in the USA. Under such a system, the government sets standards for pollution emission, and issues licences to companies allowing them to pollute up to the set standard. These licences would be marketable, so that there is an incentive for an individual company to invest in pollution-reducing technology, thereby enabling it to sell part, or all, of its pollution rights. Unfortunately, while such licences would give the right incentives to individual companies, it is not obvious how they would reduce total emission levels beyond the standards originally set. Suppose all companies reduce their pollution levels, so that there is an excess supply of pollution rights on the market. Then the price of such rights will fall to the level where sufficient companies are encouraged to return to their old ways, or new polluters are attracted into the market.

Since taxes or charges have important advantages over direct regulation, it must be asked why their use is relatively uncommon. The answer lies in politics, rather than economics. To achieve the required results through taxes would, according to most research, necessitate setting these at high levels, with consequent political costs for the government of the day. Regulatory standards have smaller direct political cost.

However, the research that lies behind this perception does not take account of growing public awareness and concern about the environment. A recent survey, by Brand New Products Limited, found that 73 per cent of consumers have a strong or average concern about environmental issues and that 40 per cent regularly consider environmental matters in some of the products they buy. Even a relatively low level of tax may be sufficient to increase public awareness of their consumption of the product being taxed, and thereby result in greater reduction of demand than would have been suggested by simple analysis of price elasticities of demand. The relative reduction of tax on lead-free petrol in the UK is an example.

Pollution taxes, therefore, can act as indicators of environmental impact to consumers. By doing so in an obvious way, they do not need to be set at such high rates as previously thought, and are therefore more politically attractive. To gain the maximum benefit from public awareness of the environment, however, taxes should be levied on the final consumption of goods, rather than at some intermediate stage of the production process. This seems to run against the 'polluter pays' principal, but in practice the outcome will be little different.

Such pollution taxes should be made obvious to the consumer, and easy to understand. Since different products have different pollution implications, it would make a system of pollution tax easier to understand if taxes were set in bands. In other words, some products might be subject to a 5 per cent tax, but others to a 10 per cent or 20 per cent tax because of the greater environmental impact of their production or consumption. Clear labelling on products, giving the tax band in which they fall, would make their potential environmental impact obvious to all.

With the public becoming more aware of environmental concerns, but unaware of the exact technical nature of these problems, there are obvious dangers from unrestrained labelling of products as environmentally friendly by manufacturers. Motorists may feel that they are 'doing their bit' for the environment by using lead-free petrol, especially with oil companies now marketing 'supergreen' petrol. Yet carbon monoxide and carbon dioxide emissions from car exhausts are arguably more important environmental concerns than lead. Pollution taxes, clearly marked on products, would make the public more aware of the best current official view on the environmental impact of different goods. Such a system would retain the beneficial incentive effects of direct per unit taxes on polluting industries. By becoming more efficient in their emission of pollutants, companies in such industries could expect their products to be moved to lower tax bands.

One concern about the use of taxes to control pollution is that they may be inflationary. Furthermore, all forms of environmental control are thought to be detrimental to economic growth. However, many environmentalists and economists would argue that traditional measures of growth are misleading, and that more appropriate measures of economic well-being would take account of the environmental impact of economic activity. Such a measure might show an improvement after the imposition of environmental regulations or taxes. Estimates cited by the OECD of the impact of environmental policies in France, for instance, show benefits at between 3 to 4 per cent of GDP, and costs at 2 to 3 per cent. The same OECD study concluded from empirical analysis of six countries that the macro-economic impact of environmental policies is small.

The government could lower other forms of tax to offset some of the extra revenue received from pollution taxes. If expenditure taxes, such as VAT, were cut, this would reduce the inflation effect, as well as reducing the impact on real incomes. In the long run, it would be logical to spend the revenue raised from pollution taxes on cleaning up the environment, which would itself boost demand, but in the short run the revenue may have to be diverted to offset the impact effects of imposing such taxes. Pollution taxes would have smaller impact on the long-run prices of the products to which they were initially applied, since the resultant incentive to reduce pollution would result in products shifting to lower tax bands as they became more environmentally friendly.

Taxes could be applied both to products that generate pollution in their manufacture (eg electricity, chemicals, pharmaceuticals) as well as products which generate pollution in their consumption (eg petrol, chemical fertilizers, aerosols). The tax bands into which individual products fell could be adjusted over time as more was learnt about such products' likely environmental impact, and about the effects of taxes on spending patterns and emission levels. This could be done in the same way that changes in other taxes are made each year in the Budget.

Governments worldwide are reluctant to take major steps on environment control, arguing that unilateral moves would place home industries at a disadvantage to their competitors overseas. But by levying taxes at the consumption stage wherever possible, the competitiveness effect on the industry of a country acting in isolation would be minimised. Suppose the UK were to adopt such a system. Imports into the UK market would be liable to the same rate of tax as UK products. If other countries were not adopting similar measures, exports from the UK would not be liable to such taxes overseas, and would therefore be competing on approximately level ground in overseas markets. Furthermore, by acting sooner rather than later, UK industry would be exposed to pressures that will be felt by industry overseas eventually. Hence, it would be possible for UK industry to get a head start in the field of pollution control, an area which can only grow in importance over the years. The adoption of such taxes by the entire European Community would be greatly preferable, however. Community-wide harmonization of pollution taxes would avoid conflict with moves towards a single market as well as reducing residual competitiveness effects.

It must be recognised that precise measurement of the costs of different forms of pollution is impossible. There is enormous uncertainty about the scale and effects of the greenhouse effect, for instance. The health implications of pollution in drinking water are not fully understood. Even when the current costs of pollution are measurable, there remains uncertainty about the future costs. If we pollute the environment now, how can we judge what might be the impact, 20, 50 or a 100 years from now? Given the importance of some environment issues, such uncertainty cannot be allowed to prevent action now. Genady Goluber, Deputy Director of the United Nations Environment Programme, has been quoted as saying about control of atmospheric pollution: 'advocating patience is an invitation to be a spectator at our own destruction'.

Conclusions

1. Economic theory has an important role to play in designing the best policy reaction to growing concerns about environmental issues.
2. Such theory would suggest that taxation to cure market distortion, which results from zero costing of pollution, is the most appropriate response. Pollution taxation corrects, rather than creates, market distortion.
3. Taxation is more efficient than regulation and encourages continued investment in pollution reducing technology.

4. The 'polluter pays' principal suggests that taxes should be imposed on polluters directly, but taxation on consumption of pollution-generating products would have the same effect.
5. Because of the growing consciousness of environmental issues among consumers, such 'pollution taxes' would not need to be set at onerous rates to have the desired effect, thereby reducing the political cost of their introduction.
6. Pollution taxes would increase public awareness of the relative environmental implications of different products. To make them easy to understand, they should be set in bands, and clearly labelled on products.
7. The macro-economic consequences of pollution taxation are unlikely to be great, and can be offset by changes in other taxation and spending. Taxation of consumption would minimise the competitiveness impact of environmental policy.

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FUTURE NSCA CONFERENCES

57th Clean Air Conference and Exhibition
BRIGHTON
15 - 18 October 1990

58th Clean Air Conference and Exhibition
EASTBOURNE
21 - 24 October 1991

59th Clean Air Conference and Exhibition
BOURNEMOUTH
19 - 22 October 1992

THE LARGE COMBUSTION PLANT DIRECTIVE HOW EFFECTIVE WILL IT BE?

P.F. Chester
Corporate Technical Director
National Power

This paper was first presented at the IBC Technical Services Conference, held in London on 5th July, on "Strategic Planning for the Control of Emissions from Combustion Processes — the Latest Developments".

In a conference devoted largely to the implementation of the Large Combustion Plant Directive, it is worth pausing for a moment to reflect on the ecological expectations that brought the Directive into being and to review, in the light of current knowledge, the prospects of those expectations being fulfilled.

The introduction to the original draft Directive, COM (83) 704, cites explicitly "the damage caused to forests, lakes, agricultural crops and monuments and other buildings" and elsewhere, "in view of the threat of the forest death phenomenon observed above all in the Federal Republic of Germany, the Stuttgart European Council called for drastic measures as a matter of priority in order to halt the damage in question".

The measures adopted in the final Directive (88/609/EEC) for new plant of a capacity greater than 500 MWth will cut SO_2 by between 80 and 95% and NO_x by up to 50%. For SO_2 emissions from existing plant, as a class, the Directive requires phased reductions from 1980 emissions by the bench mark years 1993, 1998 and 2003. Actual reductions vary from country to country, with Germany making the biggest cuts while Eire, Greece, Portugal and Spain actually increase emissions relative to 1980. The overall actual Community reduction by 2003 will be about 58%.

For NO_x emissions, the Directive provides for phased reductions by the bench mark years 1993 and 1998 for all members except Eire, Greece, Portugal and Spain. The overall actual Community reduction will be of the order 30% by 1998. No limit is defined for 2003.

The order of magnitude of the cost of reducing sulphur emissions from existing plant throughout the Community will be around £2000M pa by 2003. That is based on a rule of thumb estimate of £250 per tonne of SO_2 abated by retrofitting large boilers, including both running costs and capital charges. A similar rule of thumb for low-NO_x combustion retrofits would indicate a capital cost of £1000M for NO_x reductions to 1998 and probably little or no additional running costs unless post-combustion techniques are used.

So, will the Large Combustion Plant Directive achieve its aim to "halt the damage" to forests? That proposition was already far from clear as early as 1984. Scientists giving evidence to the House of Commons Select Committee on the Environment on behalf of the Natural Environment Research Council expressed the view "if they were to remove sulphur from the atmosphere, the German trees would still die".

They were not of course referring to the well known and classic damage near the eastern borders of Germany caused by high concentrations of SO_2 in the atmosphere. They were referring to the new forest decline widely observed in Germany, from the Black Forest to the Bavarian Alps in areas where SO_2 concentrations are quite low.

It now transpires that there are at least five different types of damage, with different symptoms, but all leading to loss of needles on conifers. No one has yet succeeded in reproducing any of these symptoms by artificial exposures to air pollutants singly or in combination. It is also evident that the degree of needle loss and its rate of progression were both overestimated in the early years by using the criterion of 10% foliage loss rather than the 20% or 25% that would be generally accepted today.

On this criterion, the 1988 German forest damage inventory shows a marked improvement for Spruce since 1985, with a current damage incidence of around 15%, Figure 1. A similar trend is shown for all tree species taken together, with an improvement starting in 1985, long before the Directive was finally implemented, Figure 2. The 1988 German forest damage survey concluded that "damage development is not a one-way street, but that even medium-severely damaged older trees may recover when general conditions for growth improve".

The most widespread form of damage to Spruce in Germany is associated with magnesium deficiency in older needles. The prevailing scientific view is that this form of damage is soil mediated. It comes about as a result of historical depletion of soil magnesium, probably by both acid leaching and tree harvesting, and has been triggered by more recent factors such as drought. Support for this view comes from work in the Black Forest by the University of Freiburg where it has been shown that the addition of magnesium nitrate fertiliser can reverse the symptoms in young Spruce trees and restore them to health.

It seems clear that the factor most determining this type of forest decline is not the current rate of acid deposition. In so far as acid deposition is involved in the depletion of soil magnesium, we are seeing the accumulated effects of a century and a half of soil acidification. Soil recovery through natural weathering of magnesium containing minerals will be extremely slow. Moreover, the rate of soil recovery is relatively insensitive to the rate of emission reduction. If more rapid recovery is required, magnesium based fertilisers are quickly effective on this form of damage.

Reduction of acid deposition is of course necessary for the longer term so that restored soil does not return to its acidified magnesium deficient state. On this timescale the Directive should reduce sulphur emissions to levels that are entirely sustainable, provided that similar action is taken in Eastern Europe.

The picture is much less clear on possible damage to trees from NO_x. There are suspicions that excessive nitrogen deposition may lead to increased susceptibility to frost and other stresses, to plant nutrient imbalances and to additional soil leaching. But whether or not this is happening in practice is still unclear. Possible mechanisms are still under investigation and the instances of highest nitrogen deposition, which occur in the Netherlands, are due to ammonia.

There is similar uncertainty surrounding the contribution of ozone to European tree damage. No one has yet succeeded in reproducing the damage symptoms by exposure to ozone. There is a further uncertainty. Although NO_x is an essential component in the photo-chemical reactions that generate ozone from hydrocarbons, the amount of ozone produced is not related in a simple way to the amount of NO_x present. Indeed quite the opposite can be the case, as in Los Angeles where lower levels of NO_x give rise to higher levels of ozone. So if the tree damage were to be due to ozone the Directive might actually make things worse.

So, if we ask whether the LCPD *itself* will restore the trees, we must conclude:-

— that it will not do so for SO_2 damage at the eastern borders of the Community because here the SO_2 is coming largely from outside the Community,

— that it will not do so for *soil-mediated* damage except on a timescale of a century or so,

— that it will help if damage is due directly to excess NO_x deposition,

— that it may, or may not, help if the damage is due to ozone.

Nevertheless, progressive emission reduction is absolutely necessary for the longer term so that acidified soil can recover and so that restored soil does not reacidify.

How will we know that the Directive has been effective?

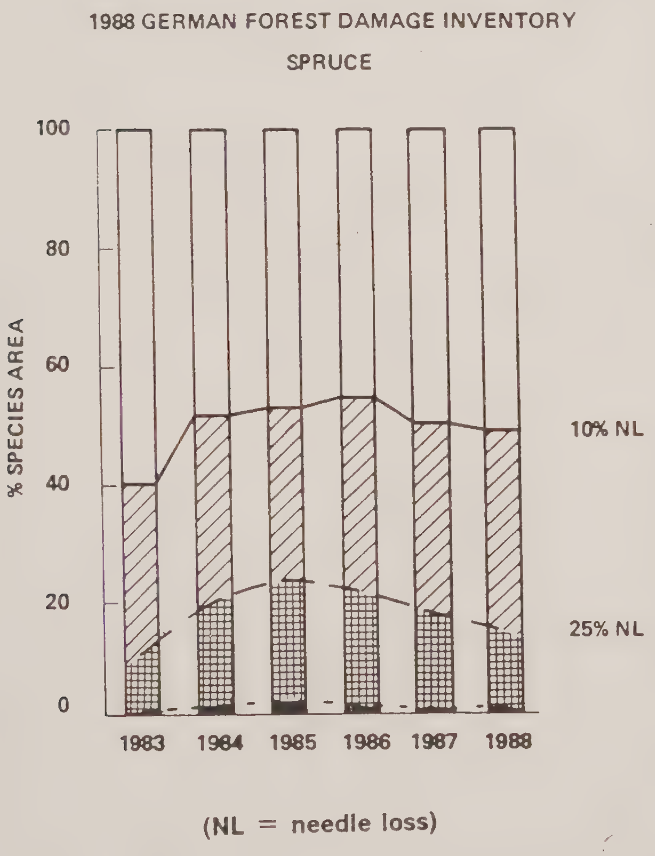


Figure 1

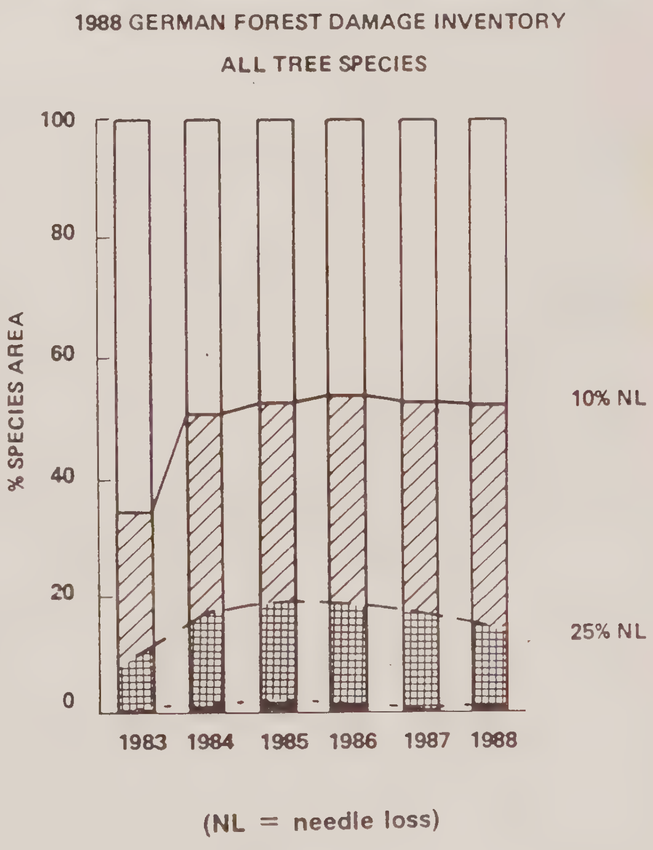


Figure 2

First we need continued forest surveys, coupled with measurements of the pollutants addressed by the Directive — forest epidemiology. One without the other proves nothing.

Second, we must continue work aimed at establishing causal mechanisms for the observed damage. Until these are clear we cannot be confident that the Directive is aiming at the right targets, even in the longer term.

Third we need to demonstrate the effectiveness of the reductions by simulating reductions in the field, for example by using enclosures, filtered air and deacidified rain to check that the trees do respond to the reduced pollutant inputs in the way that we hope for.

Now we must turn to SO_2 and fishery decline. Here too there is reason to doubt the simple expectations of the Directive. As early as 1980, scientists were realising that there was more to fish decline than acid stress from acid deposition or snow melt, Figure 3.

Norwegian lake surveys in the mid-70's had shown that lakes which were quite acid could support fish if the water contained enough calcium. Conversely, lakes that were much less acid could not support fish if they were low in calcium. Calcium was evidently as important as acidity. If the ratio of calcium to acidity was high the lake was likely to support fish. If the ratio was low, the lake was likely to be fishless.

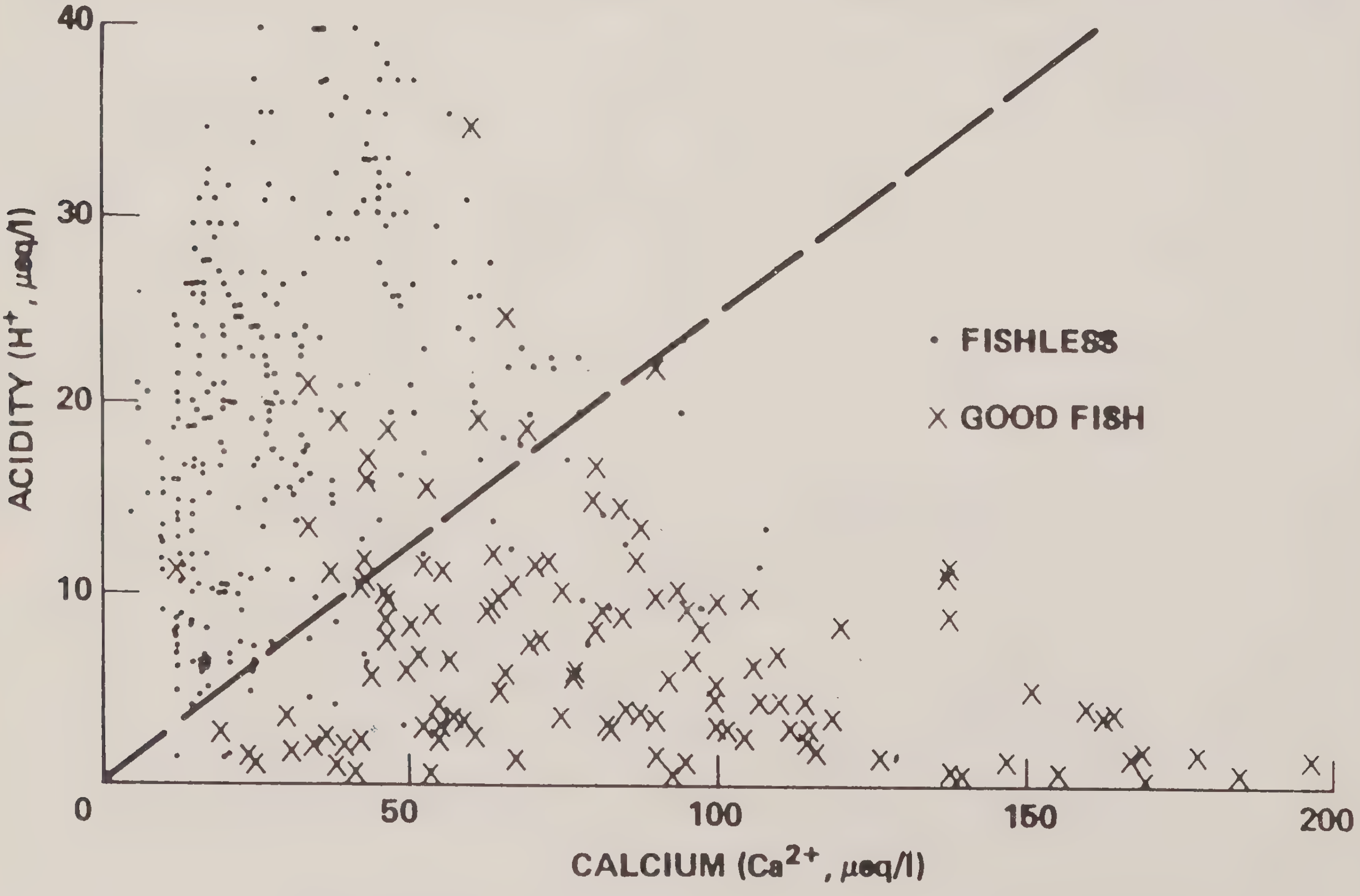


Figure 3

The fishery status of lakes in southern Norway as a function of the acidity and dissolved calcium content of the water.

We now know that the main cause of fish decline is toxic aluminium, leached from acidified soil by acid deposition. We now know that calcium is vital for fish survival both because it suppresses the mobilisation of aluminium from acidified soil and because it is physiologically necessary for the fish. The ratio of calcium to acidity is a surrogate for these more complex factors, but is the best simple empirical indicator of water quality that we have at the moment.

Acid rain passing through acid soil gives rise to surface water which is too high in aluminium and too low in calcium for healthy fisheries. Acidified soil is low in calcium because of the accumulated leaching brought about by acid deposition over a century or more since the industrial revolution and, in some cases, because of the removal of calcium in wood as a result of the harvesting of trees.

In susceptible soils, the base status of the soil has declined over the past century or so at a rate related to the acid loading. Its present status reflects the cumulative loading since the industrial revolution, Figure 4. So fishery decline is the result of historical soil acidification over a century or more combined with current acid deposition which flushes toxic aluminium from the acidified soil into surface waters.

Water quality adequate for fish cannot come about until the calcium status of the soil has recovered. Left to itself that would take a very long time — a century, or even longer, Figure 5. By comparison with this timespan, differences of action between different countries in the Community or between different drafts of the Directive pale into insignificance.

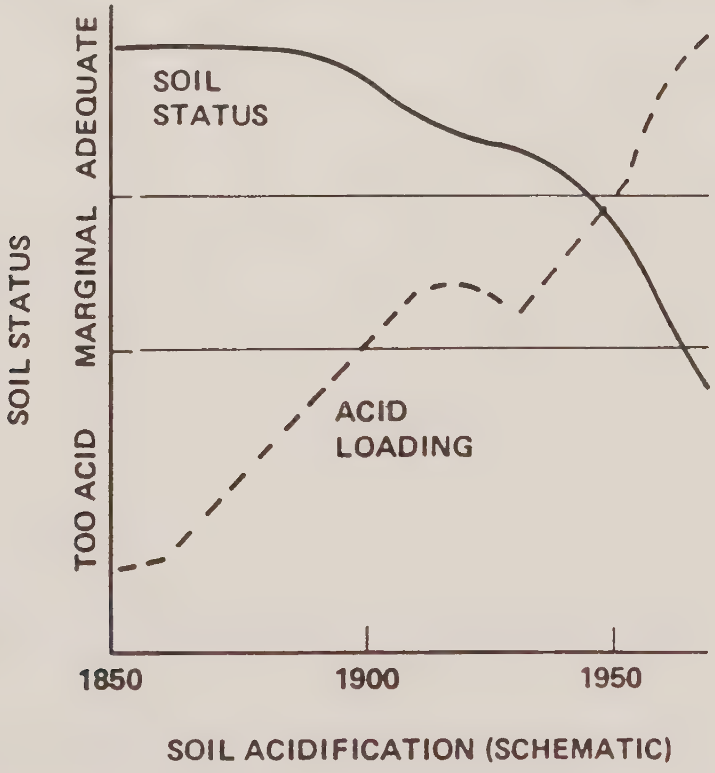
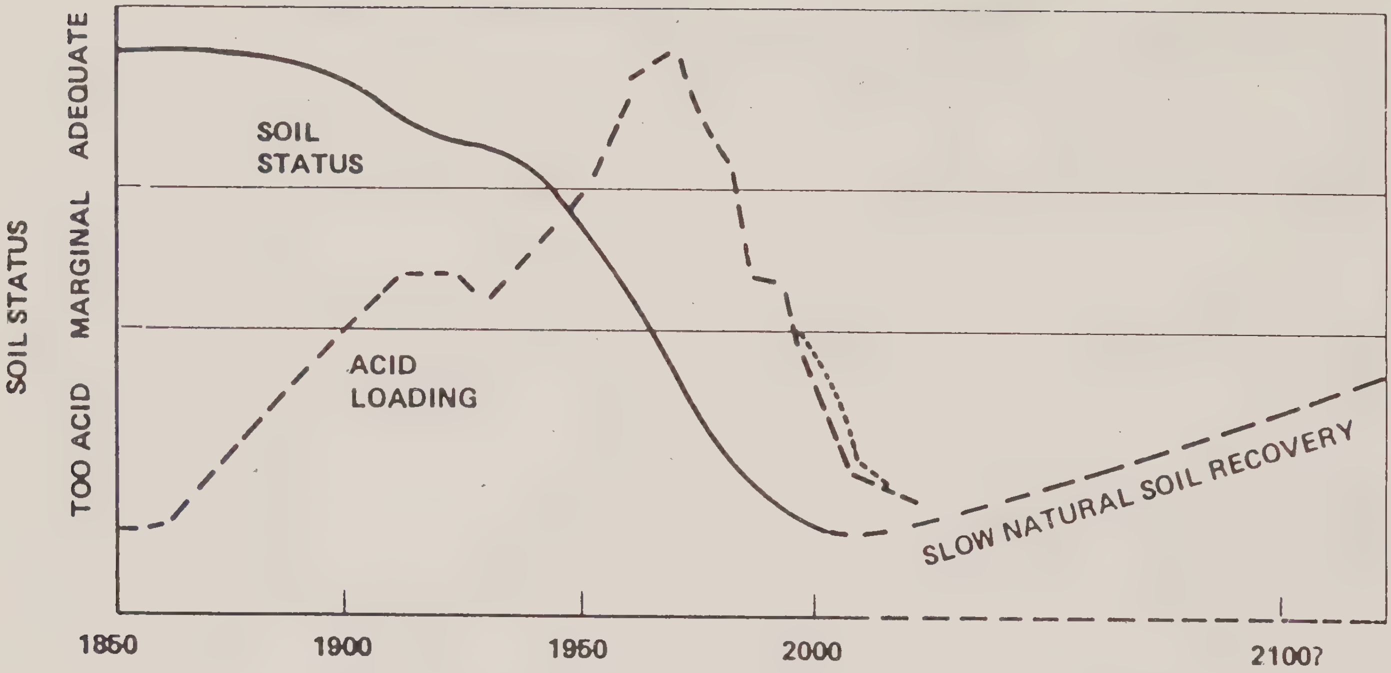


Figure 4



SOIL ACIDIFICATION AND NATURAL RECOVERY (SCHEMATIC)

Figure 5

So what does happen to surface water quality as emissions come down and sulphur deposition reduces? Certainly sulphate levels in the water come down. But so do calcium levels and the surface water stays in the unfavourable quadrant of this diagram for a very long time, probably for decades, Figure 6.

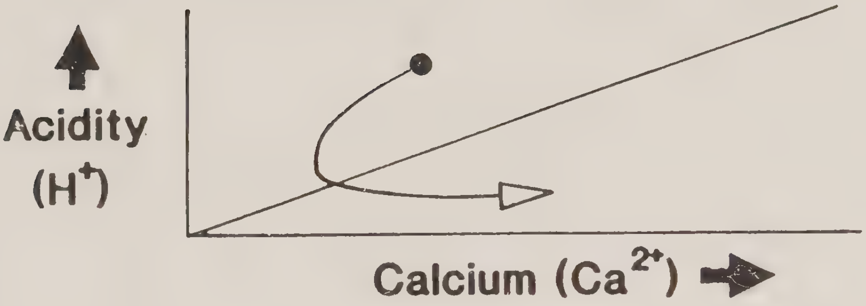
That's not just a theoretical projection. The RAIN demonstration in Norway excludes acid rain over a small catchment by covering it with a plastic top. They have been monitoring the water quality now for some three years. Sure enough, the sulphate in the surface water has gone down. But so has the calcium and the acidity has changed comparatively little. The calcium:acidity ratio of that water is not improving at all.

Restoration of fisheries requires recovery of the soil and reduction of acid deposition. Left to itself the soil would take far longer to recover than the timespan of reductions under the Directive.

But it can be speeded up if crushed or powdered limestone is applied. Calcium goes up, the acidity goes down, toxic aluminium goes down and the fish respond immediately, Figure 7. The effect lasts longer if the limestone is applied to the soil rather than to the water. We have here an analogy with the application of magnesium fertilisers to cure German forest damage.

So will the Large Combustion Plant Directive *itself* restore the fish? Evidently not, until the soil has recovered. And natural soil recovery may take a century. Moreover the rate of water recovery will be relatively insensitive to the rate of emission reduction. Clearly progressive emission reduction is absolutely necessary for soil in the longer term. But in the near term, only soil restoration will give the desired results, Figure 8.

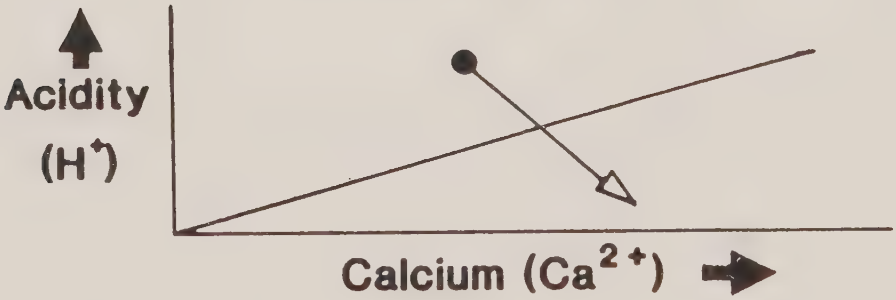
WHAT HAPPENS AS DEPOSITION REDUCES ?



- sulphate goes down
- so does calcium
- water stays in unfavourable quadrant
- probably for decades

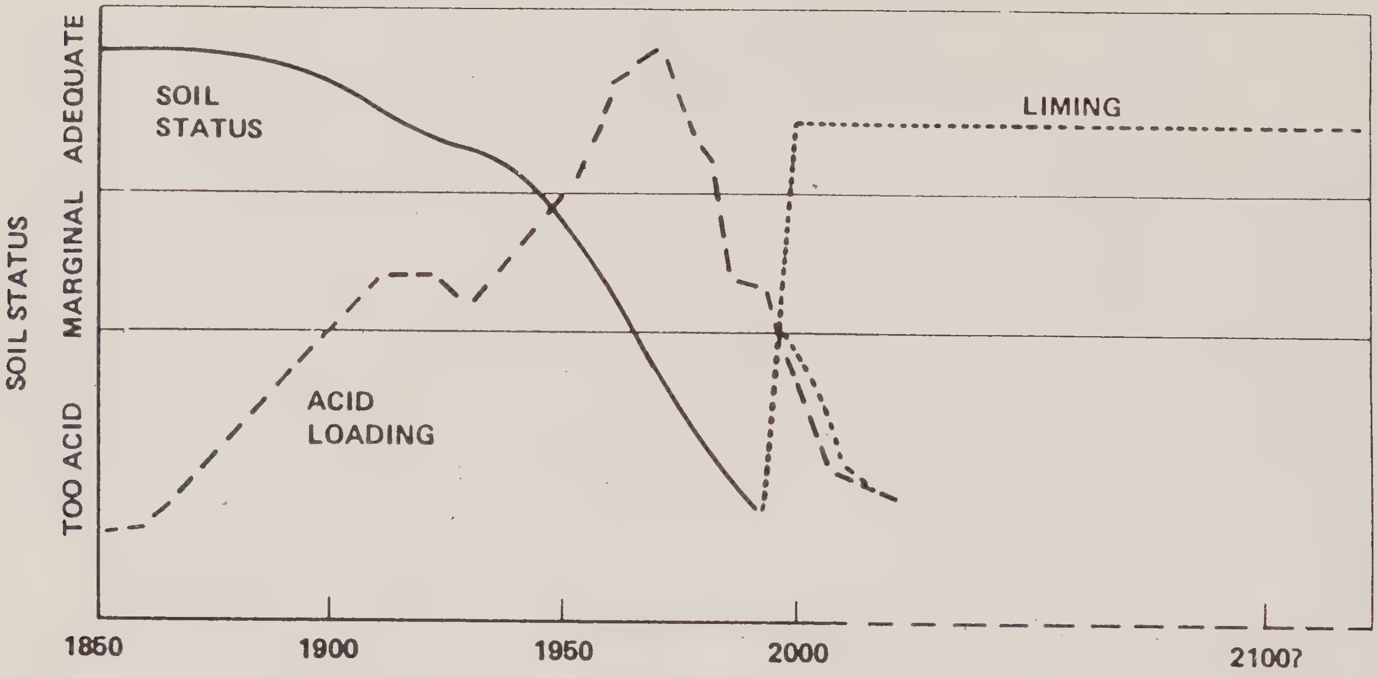
Figure 6

WHAT HAPPENS IF YOU ADD LIMESTONE ?



- calcium goes up
- acidity goes down
- fish respond immediately
- lasts longer if applied to soil

Figure 7



SOIL ACIDIFICATION AND RESTORATION BY LIMING (SCHEMATIC)

Figure 8

How will we know how successful the Directive has been?

First we must monitor both water chemistry and fisheries in the affected areas. Measurement of acidity or sulphate alone is clearly inadequate. We need measures of toxic aluminium and of calcium in addition.

Second, we need direct demonstrations of the response of surface water to reduced acid deposition using the kind of covered catchments pioneered in Norway and now being imitated elsewhere in Europe.

CONCLUSIONS

For soil-mediated damage.

- Don't expect too much from the Directive.
- It can't put right historical damage
- But it *will* prevent recurrence.
- For faster recovery invest in soil restoration.
- *Accelerated* emission reduction is not a substitute.

For excess nitrogen deposition

If this is important, the NO_x reductions described by the Directive may not be enough:-

- Vehicles account for a substantial proportion of NO_x emissions.
- Ammonia is not affected by the Directive.
- Further stages of NO_x reduction from combustion plant may be necessary.

Who pays?

- Electricty consumers will pay for emission reductions under the Directive.
- But who will pay for putting right the accumulated acidity from a century of past emissions?

In August the Government published its consultation paper, *Implementation of the Large Combustion Plants Directive.* NSCA's response will be published in the next issue of *Clean Air.*

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INTERNATIONAL

MAN AND HIS ECOSYSTEM

REPORT OF THE 8th WORLD CLEAN AIR CONGRESS

The International Union of Air Pollution Prevention Associations, under whose auspices the Congress is held, is a non-political union of national professional or voluntary non-profit making associations concerned with the maintenance of clean air. IUAPPA was founded in 1964 by six national associations, of which the NSCA is one. It now has 28 members in 30 countries. World Congresses are held every three years.

This year's Congress which was held in The Hague from 11th-15th September, attracted nearly 800 delegates representing some 40 countries world wide. Disappointingly, despite the self-professed 'greening' of UK industry and politicians, and the high priority being given to the need to find rapid solutions to today's problems of serious atmospheric pollution, the UK was represented by a mere 22 delegates.

The Congress which was organised by the Dutch Clean Air Society, Vereniging Lucht, was honoured by the presence of HM Queen Beatrix of the Netherlands for the opening ceremony. In welcoming the delegates, the Congress Chairman and IUAPPA President, Dr. Louis Clarenburg drew attention to the the enormous complexity of the subject 'air pollution': depletion of the ozone layer, long-range transport of pollutants, atmospheric chemistry leading to the transformation of pollutants into acids, and photochemical smog; and he noted the role of aerosols and clouds in atmospheric chemistry had yet to be adequately assessed. Dr. Clarenburg reiterated the need for international co-operation and international law as being central to the solution of problems. While the closing session would address the issue of global climate change, it had been thought appropriate to look at the way different countries approach air pollution control — both basic philosophy and main lines of legislation, in the opening session. Dr. Clarenburg hoped the Congress would provide a platform for the originating of friendly ties between scientists which could form the basis for a fruitful co-operation in the future.

Action now

The opening address was given by Mr. Ed Nijpels, Minister of Housing, Physical Planning and Environment in the Netherlands, who expressed the Government's pleasure that the IUAPPA Congress was being held in The Hague. He said that the serious threats to the global environment meant that there was no longer any excuse for delaying the introduction of drastic measures to curb pollution, and these would affect everybody's lives. The Dutch Government had recently drawn up a National Environmental Policy Plan aimed at radically cutting pollution from all sectors.

In addition, the Dutch Government were convening a Ministerial Conference in Early November which would address the problems of atmospheric pollution and climate change. Already fifty environment ministers planned to attend or be represented at the conference, which is to be held in conjunction with UNEP and the World Meteorological Organisation. He hoped the outcome of the conference would be an international convention setting out concrete mechanisms for the way forward.

The Minister highlighted four areas of concern which he felt were the most important issues for the next decade:

- Air pollution and acid rain — the need for international co-operation in developing policies — the need for energy reductions.
- transport — clean technologies must be developed as soon as possible;
- global climate — here again international co-operation was needed between scientists, engineers, NGOs, the public and policymakers; it was also imperative that carbon dioxide emissions were reduced very quickly;
- public health — more liaison was needed between doctors and air quality scientists to develop air quality standards accepted by all.

The recently appointed EEC Commissioner for the Environment, Carlo Ripa di Meana, also stressed the need for urgent remedial actions today "rather than spend another five years discussing where the world might possibly be in the year 2050". In his view immediate measures included:

- agreement to halt the growth in energy consumption and within the next decade to ensure that energy consumption in the industrialised world will start to decline.
- higher priority to the development and use of non-fossil energy, such as solar, wind and biomass energy.
- cease investing in energy infrastructures — which only make sense if future energy consumption increases as it did in the past — in particular the building of new large power plants.

Global Challenges

The Commissioner stressed the need for the whole approach of the Community's environmental policy to change. It had to move from a policy which simply reacted to problems as they arose to a global policy with ambitious aims and, above all, the technical and financial means to carry it out.

The new policy had to be able to face not only global challenges but also challenges within the Community. It had to seek to reconcile economic growth and a high level of environmental protection and it had to be fully integrated into all the Community's policies, in particular the single market and economic and social solidarity. The Commission's proposal for a European Environmental

Agency, he said represented a first step in this direction. It would play an important role both on national and international levels in the scientific gathering and interpretation of environmental data.

But the Commissioner said any genuine global policy if it was to be effective must face and resolve two fundamentally important issues.

First, at the international level a new relationship between the northern and southern hemispheres must be set up and a solution found to the problem of third world debt. Secondly, at a Community level, new resources must be found urgently for action to prevent or remedy the damage caused by pollution.

The Commissioner acknowledged the necessity for governments to rethink economic and politcal priorities in the context of new environmental constraints, and the fact that if we are to enjoy a better environment, we must accept the costs involved. The global aspect of air pollution he said, is a challenge of hitherto unforeseen dimensions and we have to consider measures such as taxation and transfer of funds from area to area as potential instruments in future policymaking.

US Clean Air Act

Following President Bush's election to the US Presidency and the appointment of Mr. Bill Riley "the first full-time environmentalist" to head the Environmental Protection Agency, environmental protection issues have already been raised in importance, according to EPA representative, Mr. Beale. The EPA is being reorganised to stress the importance of pollution prevention and a restructuring of the US Clean Air Act and the way it works is also in hand. Planned amendments will give support to economic incentives and strengthen enforcement provisions: company chief executives will be required to sign a certificate that their company is operating in compliance with pollution control regulations; violations will be subject to criminal law and as such carry the possibility of a jail sentence.

Technical sessions

Some 378 papers and posters had been selected for presentation reflecting the Congress's central theme of man and his ecosystem. These had been divided into five sub-themes:

•Man
Human health and dose-response relationships
Psycho-social effects.

•Indoor Air
Air quality in relation to occupational health
Air quality in public buildings, the home and the car.

•Animals and Plants, Materials
Biological effects
Acidification
Effects on materials.

•The System
Monitoring/surveillance
Air pollution meteorology
Air pollution chemistry
Aerosols
Instrumentation.

•The Man-Made System
Policy towards clean air
Emissions, air pollution control
Integrated approach to control
Economic aspects:costs and benefits
International co-operation and international law.

All the papers are available in the Congress Proceedings — a five volume set totalling some 2250 pages. The fifth volume does contain both an author index and a keyword index. The proceedings are published by Elsevier. NSCA has some sets available for sale on behalf of IUAPPA.

IUAPPA Declaration on Climate Change

At its meeting in Dallas in June 1988 the Executive Committee of IUAPPA considered the pending threats to the global atmosphere occurring as a result of world wide societal developments. The issues were considered of such fundamental importance to the future wellbeing of mankind and the globe's ecosystem, that the Union should independently register its concern at the highest political levels. Accordingly it was agreed that a Declaration on these matters should be prepared: it would be a non-political document, concerned with the scientific evidence only, and would be addressed to the United Nations.

As part of the Congress closing ceremony a seminar "Saving our global (atmospheric) ecosystem: a challenge for the next decades" was held under the Chairmanship of Dr. A King, Chairman of the Club of Rome. He congratulated IUAPPA on its initiative and said that the time was now past when the various forms of pollution could be regarded as relatively localised situations, which could be cleaned up by more or less simple modifications of industrial, agricultural or municipal practices — at a cost, but one which could be borne. The appearance of macro-pollution phenomena such as depletion of the ozone layer, acid rain and above all, the greenhouse effect of the warming up of the surface of the earth are essentially global in nature and could not be eliminated or controlled by individual countries in isolation. Despite all the uncertainties due to our imperfect understanding of the workings of the ecosystem, they appear together to constitute a threat which cannot be ignored by the world community.

Three papers, (which will shortly be available) were presented:

- Trends in atmospheric trace gases (Prof. G. Megie, France)
- Ozone layer depletion and tropospheric ozone increase (Prof. P.J. Crutzen, FRG)
- Atmospheric radiation budget and climate change (Prof. T. Wigley, UK)

The Declaration calls on all governments as a matter of utmost urgency to co-operate in investigative programmes. In particular, attention is asked for:

— Identification of the causes, effects and trends of climatic change, both natural and man-induced;

— Quantification of global and regional budgets of important atmospheric gases, their cycles and interactions.

— Identification and quantification of feed-back mechanisms;

— Improvement of global models to better anticipate the consequences of global warming in order to develop effective intervention strategies;

— Development of energy efficiency measures and energy conservation programmes;

— Development of carbon dioxide and methane emission control technology;

— Development of non-fossil fuel energy sources.

UPDATE

RWMAC MEETING

NSCA was represented at the second Public Interest Panel Meeting of the Radioactive Waste Management Advisory Committee on 28 July. There was a wide-ranging discussion of radioactive waste management issues, including the proposed investigation of Sellafield in Cumbria and Dounreay in Caithness as potential locations for a deep disposal facility.

The meeting reviewed the progress made by RWMAC on matters raised at the first panel meeting, including the issues of reprocessing and institutional arrangements for radioactive waste management, particularly in the light of privatisation of the electricity supply industry.

Other issues of concern to panel members which were raised included the potential for high level waste to be reclassified in time as intermediate level waste; the long term storage of waste as opposed to its disposal; whether the sites being proposed for further investigation were the safest possible sites, and general lack of confidence in pronouncements by the nuclear industry.

LONDON RADIATION MONITORING PROGRAMME

On 21 September, the London-wide network of continuous radiation monitoring equipment was completed when the monitor at London Scientific Services' Great Guildford Street laboratories was formally switched on.

The network of five stations — at Harrow, Dagenham, Greenwich, Sutton and Central London — will continuously monitor radiation levels in the air, with a simultaneous hard print-out provided at each station. If radiation exceeds a certain level at any of the stations, then an alarm is triggered locally and the equipment automatically informs nominated people by ringing pre-set telephone numbers. Individual London Boroughs have formulated their own plans for nuclear emergencies.

At present, 20 of the 32 London Boroughs contribute to the cost of running the service, which is intended as an early warning system, independent of the Government or the nuclear industry. The London-Wide Radiation Monitoring Programme is run by London Scientific Services (LSS), formerly the scientific services department of the Greater London Council, and now part of the High-Point plc group of companies.

AIR POLLUTION MONITORING AT MANCHESTER AIRPORT

Although very few complaints relating to air pollution are received at Manchester Airport, recent press articles have suggested a link between air traffic movements and acid rain in South East England. Also increasingly strict emission controls and other environmental pressures are likely to have an effect on air traffic movements in the future. Indeed the Swedish Government has decided to impose a tax on nitric oxide and hydrocarbon emissions from

Swedish domestic airlines. Regulations defining emission limits for smoke and exhaust gases from air traffic have been in force in Switzerland since 1 January 1985.

Manchester Airport has now commissioned the Acid Rain Information Centre at Manchester Polytechnic to report on the air pollution implications of the Airport's current and future activities. The monitoring strategy proposed will measure all major air pollutants and an emissions inventory will be constructed to determine the local, regional and national importance of the Airport as a source of air pollutants. Measured data will be compared to national and international standards for air quality. Modelling of emissions and measured air concentrations will allow forecasts of future emissions and concentrations to be determined and used as policy inputs.

Other environmental initiatives recently announced by Manchester Airport are a combined heat and power station and an aircraft vortex damage compensation scheme. The CHP station will provide half the Airport's electricity needs and most of its heat requirement in 1992, and reduce atmospheric pollution associated with the Airport's operation by 50,000 tonnes each year.

CONTROL OF SMOKE POLLUTION

A Private Members' Bill promoted by Conservative MP Andrew Hunter successfully completed its progress through Parliament and took effect on 21 September. The Bill extends the Clean Air Acts of 1956 and 1968 and is concerned with the control of dark smoke from chimneys of private dwellings outside smoke control areas. It will enable local authorities to act on complaints from the public to require abatement, and close loopholes which have arisen in the enforcement by local authorities over the control of dark smoke emissions. Local authorities will be able to prosecute for illegal night time burning where the colour of the smoke cannot be assessed and to take action against anyone — not just the occupier of the land — who causes or permits dark smoke to be emitted.

FLY-TIPPING

A Private Members' Bill introduced by Labour MP Joan Ruddock has also successfully passed onto the Statute Book.

The Control of Pollution (Amendment) Act 1989 establishes a registration scheme for waste carriers and introduces penalties for carriers whose vehicles are used in fly-tipping. Regulations to bring the Act into effect are expected before the end of 1989.

MUNICIPAL WASTE INCINERATORS

Agreement has now been reached on the EC Directive relating to air pollution from existing municipal waste incinerators. This follows the adoption of a Directive relating to new plant for which tough new emission standards have been imposed on all plant authorised after 30 November 1990.

Under this second Directive existing municipal incinerators will be required to improve their emission standards, eventually meeting those set for new plant. It is likely that the high expenditure needed to bring most of the UK's existing municipal incinerators up to standard will in fact result in the closure of many.

POLLUTER PAYS DIRECTIVE

The European Commission is proposing a Directive which will make polluters financially responsible for any damage caused by their activities for up to 30 years after the pollutant was produced. The Directive would make it a requirement for there to be only an "overwhelming probability" that a particular pollutant was responsible for damage rather than the necessity of having to establish absolute proof. The Directive will also enable groups of people to bring a charge of damage to the environment; apart from in the Netherlands, France and Italy, only governments may sue for environmental damage.

VOLATILE ORGANIC COMPOUNDS

Volatile Organic Compounds — VOCs — are organic compounds which evaporate easily and contribute to air pollution mainly through the production of secondary pollutants such as ozone, which is also a greenhouse gas. VOCs include hydrocarbons and other more complex organic substances; some are produced by natural processes, but motor vehicles and solvents are also significant sources.

The European Commission is now looking at controls on emissions of VOCs, and following a meeting on photochemical pollution, three working groups are being set up. These will look at respectively sources of solvent emissions and options for abatement; monitoring strategies for VOCs; and data which can form the basis for advising on an appropriate evaporative emission standard for motor vehicles.

NSCA issued a policy statement on VOC emissions in 1988 (see *Clean Air*, Vol. 18, No. 2), which is being kept under review as results of further research studies become available. So far as fixed sources are concerned, NSCA's current policy is that equal weight should be given to controls on solvent evaporation from industry, which is a greater source in mass terms of VOCs than vehicles. For mobile sources, NSCA was of the opinion that the adoption of charcoal canister technology would significantly reduce evaporative emissions in the automotive sector.

EURO ENVIRONMENT AGENCY

EEC Environment Commissioner Carlo Ripa di Meana has announced plans to set up an European Environmental Agency. The main functions of the Agency will be to gather scientific data on environmental problems, including air and water quality and soil pollution. The new Agency would be independent of the European Commission and have no legal powers. Countries outside the European Community will be invited to participate in the Agency's work.

At their meeting in September, EEC Environment Ministers agreed on the principle of setting up such an agency, although sharp differences remain about the scope of the agency and its relations with non-EEC countries.

RCEP LOOKING AT WATER QUALITY

The Royal Commission on Environmental Pollution has begun an investigation into the quality of Britain's water supplies. Among the areas likely to be examined are the effects of nitrate contamination in ground water. The RCEP is expected to take up to two years to complete its study.

GLOBAL WARMING SOLUTIONS

A briefing document published recently by the Association for the Conservation of Energy says that cutting carbon dioxide emissions through the more efficient use of fossil fuels is the key option available for combatting global warming; ACE say that unless this happens "none of the non-fossil fuel energy options such as renewable energy sources or nuclear power, make sense". ACE propose a six-point energy conservation agenda to combat global warming:

- A requirement for the privatised electricity industry to compare the cost of new supply investment with the cost of conservation programmes;
- Efficiency labelling for appliances and buildings;
- Tougher building regulations;
- A major public sector programme, including contract energy management;
- Grants and fiscal incentives for energy efficiency in all sectors;
- A new Department of Environmental Assessment.

GREENHOUSE STUDY

The Watt Committee on Energy is preparing a report on how energy users and producers can help combat the greenhouse effect. The study will concentrate on the opportunities for reducing the build-up of greenhouse gases in the atmosphere, the commonest of these being carbon dioxide (CO_2). Ways of reducing emissions of CO_2 by the energy industries (such as from power stations) will be one of the chief topics. The working group will look at ways of using fossil fuels more efficiently, possibilities for switching to fuels that emit less CO_2, combined heat and power opportunities and substitutes for fossil fuels including nuclear power and renewable energy sources. The extent to which increasing energy efficiency can contribute to reducing the greenhouse effect, and energy saving options in the home, in industry, in transport use and in agriculture will also be examined. The report is expected to be completed by Spring 1990.

CLIMATE CHANGE AND THE OCEANS

Research is also due to start early in 1990 with the aim of increasing understanding on the effect of the oceans on controlling climate. At the moment computer models compiled to investigate global warming have only a simple description of the effect of ocean circulation on the atmosphere. The World Climate Research Programme of the World Meteorological Congress is to investigate three topics:

- climate prediction over three months (in an attempt to extend weather forecasting periods);
- climate prediction over four to five years; and
- predictions over decades, including the use of ocean circulation measurements to monitor global warming.

CEGB PLANS WIND FARM

The CEGB has applied for planning permission to build 25 wind turbines on a square mile site at Capel Cynon in West Wales. If planning permission is granted the CEGB expect the wind farm to begin generating electricity by Autumn 1990 and to be fully operational by the following Spring, providing electricity for about 5,000 people.

Two other sites — in Cornwall and in the Northern Pennines — are also under investigation. As well as testing the technical and economic viability of generating electricity from the wind, one of the purposes of the £28 million wind farms programme is to examine the effects on the environment and the reaction of the public. The programme is jointly funded by the Department of Energy, and National Power and PowerGen, the two successor generating companies to be formed under the Government's electricity privatisation proposals.

Interest in generating power from alternative sources, such as wind farms, is likely to increase significantly following the Government's announcement that the Electricity Bill will include a provision that by the year 2000 up to 600 megawatts of the non-fossil fuel obligation will be reserved exclusively for renewable sources of energy.

The CEGB has also produced a video *Power from the Wind*, which examines the historical use of the wind's energy and the current revival of interest in wind power. The video looks at the development of wind turbines, the part they can play in electricity production, and the plans for the three proposed wind farms.

The video (available on VHS, Beta and U-matic formats) may be borrowed on free loan or purchased from the CEGB Film & Video Library, Viscom Limited, Park Hall Road Trading Estate, London SE21 8EL.

SUPER UNLEADED

Now that many of us have had our cars adjusted to run on 95 octane unleaded petrol, two (at the time of going to press) companies, BP and Esso have launched "super" grades of unleaded. The new high-octane unleaded means that any car capable of running on unleaded petrol can now use the new "super" unleaded without the need to adjust engine timing, and with no loss of performance — a claim also made in respect of the lower-grade unleaded! Cars which have been adjusted to run on ordinary unleaded can also use the new super grades but may need to have the engine adjusted back to its original setting to gain the full benefit.

To help the many motorists who are still confused about the "what" and the "why" of unleaded petrol, Esso has published a booklet answering many of the questions commonly asked and including a detailed list of cars, the grade of petrol they can use and whether any adjustment is needed. (The information is current as at July 1989.)

The booklet makes interesting reading if only for giving an insight into how individual car manufacturers have responded to the call for lead-free petrol. Of the UK manufacturers, Austin Morris alone appear to offer very few models capable of running on lead-free petrol. Of the 33 models listed in Esso's booklet, 30 can run on leaded petrol *only*, with the other three able to run on either. However for those readers wishing to buy a Rolls Royce, all models can run on super unleaded without adjustment and on "ordinary" unleaded after adjustment!

COSHH REGULATIONS

The Control of Substances Hazardous to Health Regulations 1988 came into force on 1 October. They introduce a new legal framework which will apply to all types of businesses, including factories, farms, quarries, leisure and service activities, shops and offices. The Regulations require businesses to make a written assessment of all work which is liable to expose any employee to hazardous solids, liquids, dusts, fumes, vapours, gases or micro-organisms, and the precautions needed. Other requirements include the introduction of appropriate measures to prevent or control the risk, monitoring exposure of work and health surveillance. Records required under COSHH have to be kept for up to 30 years.

Two Codes of Practice approved by the Health and Safety Commission have been published which give practical guidance on the Regulations. These are the *Control of Substances Hazardous to Health (General ACOP)* and, *Control of Carcinogenic Substances (Carcinogens ACOP).*

OZONE LEVELS RISE IN HEATWAVE

The July heatwave in the UK resulted in low-level ozone concentrations soaring to well-above World Health Organisation recommended safety guidelines. Measurements carried out by London Scientific Services in Central London on 22 July — the hottest day of the year — recorded concentrations of 112 parts per billion; and on 24 July a reading of more than 100ppb was recorded. The WHO safety guidelines are 76.2-102ppb for up to one hour and 51-61.2ppb over eight hours.

According to a report* published in July by Friends of the Earth increased levels of air pollution are putting the health of one in five people at risk. Infants, the elderly and those with heart and chest complaints are most vulnerable. FoE wants the WHO air quality guidelines which have much stricter limits than those set in European Community Directives to be adopted in the UK. In addition, EC Directives only cover sulphur dioxide, nitrogen dioxide and oil particulates, and not carbon monoxide or low-level ozone.

FoE has also called on the Government to issue smog alerts when levels are such as to put vulnerable groups at risk, and for national montoring networks for carbon monoxide and hydrocarbons to be set up. Since publication of FoE's report the Government has announced that ozone levels will be published.

The European Commission has been giving consideration to the setting of an Air Quality Standard for ozone. However in the light of experience in the USA where some 100 cities are still failing to meeting the ozone AQS (0.12ppm) set in the 1970s, the Commission may decide that setting a limit in a Directive may not be feasible. An alternative approach would be an air quality guideline.

***Air Pollution and Health, FoE, £5.00**

ACTION ON LITTER

The Government is planning tough new measures to combat the growing problem of litter. Key proposals in the package of measures published in a consultation document include: the maximum fine for dropping litter to be increased to £1,000; local authorities and other landowners to have a specific duty to keep their land clear of litter; and a new Code of Practice setting out standards that local authorities and other landowners will be expected to meet.

INDUSTRIAL NEWS

LANDFILL GAS MONITORING

The dangers from gases leaking into buildings located on former landfill sites can now be checked by a new service from Harwell Laboratory. The Emergency Response Scheme, available round the clock, is provided by Harwell's Environmental Safety Centre.

The Scheme is designed to investigate problems at industrial, commercial and leisure complexes built on former landfill sites. It also covers developments close to working sites, and is aimed at the owners, developers and their financiers, and occupiers of sites within 200 miles of Harwell. An annual charge covers an initial site visit, installation of a telemetry link to Harwell, quarterly inspections of the site, up to four emergency call-outs, and all the costs for staff, equipment, travel and administration.

Emergency Response Scheme experts will carry equipment that will permit an assessment of the extent of the incident:

- gas sensors will be checked to establish whether they are functioning correctly. Where monitoring equipment fails the supplier will be contacted for immediate repair or maintenance;
- for genuine incidents, portable monitoring equipment will be used to verify gas concentrations and for monitoring of trends;
- where gas build-up has occurred, appropriate blowers will be used to disperse the gas; but if an incident cannot be resolved by blowers and is not considered serious, recommendations will be made for remedial measures;
- if the incident presents or is a potential risk to the public, the appropriate authorities will be contacted to carry out emergency measures.

Reader Enquiry Service No. 8924

CHIMNEY HEIGHT CALCULATION BY COMPUTER

A software package for carrying out chimney height approval calculations is now available for use on IBM PC compatible computers.

This software calculates chimney heights in accordance with the Third Memorandum, producing printed reports showing all data used in the calculation as well as the result. All types of plant are covered including fan dilution installations. Rapid recalculation for different parameters is allowed for with minimum duplication of data entry.

The program has been written by an Environmental Health Officer, and features full on-line context specific help screens. The system will run on any microcomputer using PCDOS or MSDOS with a minimum of 256K RAM and a single floppy disk; it is available on either 5.25 or 3.5 inch floppy disk at the all inclusive price of £28.

For further information write to P.S. Fisher (Environmental Health Software), 4 Orton Grove, Penn, Wolverhampton WV4 4JN.

Reader Enquiry Service No. 8925

CLINICAL WASTE DISPOSAL

West Midlands-based Clean World Environmental Limited, and Basic Energy (UK) Limited have signed an agreement to develop a network of hi-tech incinerators to deal with the disposal of clinical waste. The two companies will offer health authorities a complete management system for clinical waste collection and disposal; the first of a new generation of incinerators designed for dealing effectively with clinical waste is to be launched in the south east, followed by a further unit in the West Midlands.

The companies are aiming their service at health authorities who have been unable to install their own incinerators because of the high capital costs and lack of money for health service projects.

Basic Energy (UK) is the UK arm of a US company, Basic Environmental Engineering and their incinerators which meet the latest EEC regulations for performance and exhaust emission, were developed specially for dealing with "difficult" substances, especially clinical waste. Clean World who will provide a professional collection service for clinical waste, using operatives with experience, do not use landfill sites under any circumstances.

Reader Enquiry Service No. 8926

NEW ENVIRONMENTAL MONITORING SERVICES

Enviro Technology Services of Stroud, Gloucestershire, has introduced a new service offering a comprehensive approach to the gathering of air pollution data.

The service is based on OPSIS, a system which allows flexibility in the detection and measurement of gaseous pollutants in the atmosphere, and is intended to provide information for subsequent professional analysis.

OPSIS makes use of the fact that different gases absorb specific wavelengths from the visible spectrum. A system will include a controlled lightsource and a sensor, light reaching the sensor being depleted by gases in the intervening atmosphere. The system's spectrographic analyser is then able to determine the presence of specific pollutants and their concentrations, with data being logged for subsequent analysis. Data is retrieved as a detailed report listing pollution levels recorded at specific time intervals (minutes, hours, days, etc.).

OPSIS will detect any substance exhibiting a recognisable spectrographic "fingerprint". In environmental health applications it will record levels of NOx, SO_2, O_3, HCl, Hg, Benzine, Formaldehyde and other Hydrocarbons.

Enviro Technology Services has also introduced a mobile environmental monitoring laboratory to support the work of consultants and other environmental professionals. The laboratory is designed to provide detailed data on air quality and pollution levels. All equipment is self-powered, allowing siting in any location with reasonable road access. If required, the mobile lab can also be extended by the use of fixed instruments — for stack monitoring, for example.

Reader Enquiry Service No. 8927

POLLUTION ABATEMENT AWARD FOR WL GORE

The Livingston-based filtration products division of WL Gore & Associates, headed by North West Division member Bob Hayhurst, has won the Pollution Abatement Technology Award, one of four categories in the Better Environment Awards for Industry. The award follows Gore's successful introduction of a new type of Gore-Tex membrane filter bag which is said to virtually eliminate dust pollution from metallurgical plants, coal-fired power stations and municipal incinerators.

The new filter bag combines a very fine microporous membrane of expanded PTFE with a glassfibre backing fabric which can withstand the high temperatures (up to 288°C) and harsh chemicals which characterise many potentially pollutant processes. In many cases, the product has cut dust emissions to 1mg m^{-3} or less and the non-stick properties of PTFE keep the filter membrane free from dust cake and so achieve constantly high airflow rates and consistently low pressure drop, with resultant savings in fan energy.

In flue gas desulphurisation plants producing sulphuric acid by-product, the filter bags have purified flue gases to the extent that less stoppages are necessary for ridding pipework of the contaminants which passed through conventional filter media.

Reader Enquiry Service No. 8928

BOOKS & REPORTS

ENERGY POLICY IMPLICATIONS OF THE GREENHOUSE EFFECT

HMSO, 1989. £8.70

This report from the all-party House of Commons Energy Committee looks at the implications for government policy of the greenhouse effect, and examines alternative ways of producing energy while reducing emissions of greenhouse gases. The committee while rejecting the idea of a carbon tax to be imposed according to consumption of fuels which produce carbon dioxide, is in favour of tax measures covering pollution costs from all energy sources. Among the Committee's many recommendations are calls for more research on global warming, more attention to be paid to energy efficiency and conservation measures; the report also stresses the importance for co-operation and initiatives — both EEC and worldwide — to combat the problems of rising CO_2 emissions.

DIOXINS IN THE ENVIRONMENT

Pollution Paper No. 27, Department of the Environment, 1989. HMSO. £8.60

The report discusses the known sources of dioxins in the environment and the various ways in which they may be controlled, reduced and monitored. In the UK the most important sources of dioxins are thought to be municipal waste incinerators, coal and vehicle exhaust. Preliminary studies also indicate that straw and stubble burning may be a significant source. The report acknowledges that there may be a small risk to health from dioxins and that further action should be taken to reduce the amounts released into the environment.

THE ENVIRONMENTAL BUSINESS HANDBOOK

Published by Euromonitor, 1989. £65.00. ISBN 0 86338 317 3

Yet another in the growing list of books which wants to help business come to grips with environmental issues and to understand that new species — the "green" consumer. The book deals with everything from acid rain and vehicle emissions to whaling, vegetarianism and the Gaia Hypothesis. A rather astonishing section on 'information sources' does nothing to encourage confidence in the book as a handbook for business — is the Suffolk Countryside Campaign really an *international* environmental pressure group, along with the National Campaign for the Protection of Badgers and NSCA?

INTERNATIONAL HANDBOOK OF POLLUTION CONTROL

Ed. Edward Kormandy. Published by Gower Publishing Company, 1989. £49.00. ISBN 0 566 09047 3

Taking as its starting point that pollution knows no boundaries, this book provides a very broad overview of pollution control in 24 countries. Each chapter looks at major pollution problems from a regional, national and transboundary perspective, policies and legislation for control of pollution, and the role of governmental and non-governmental bodies. An interesting book for anyone requiring basic information on pollution around the world.

THE EFFECTS OF ACID DEPOSITION ON BUILDINGS AND MATERIALS IN THE UNITED KINGDOM

Building Effects Review Group. Publisher: HMSO, 1989. £11.25. ISBN 0 11 752178 7

This interim report represents the first compilation of the findings of the Building Effects Review Group. Five expert sub-groups were set up, dealing with air pollution modelling, site experience, laboratory tests, preservation techniques and materials inventory. The report concludes that current rates of weathering of stone on historic buildings seems to be higher than natural, but says that there is no unequivocal evidence that present rates of weathering are significantly different from those in the recent past despite changes in emissions of air pollutants. A further report is likely in 1992.

RADIATION EXPOSURE OF THE UK POPULATION — 1988 REVIEW

J.S. Hughes, K.B. Shaw and M.C. O'Riordan. Publisher: HMSO for National Radiological Protection Board, 1989. £7.00. ISBN 0 85951 312 2

This is the fourth review of UK population exposure to radiation — the previous reviews being issued in 1974, 1978 and 1984. It covers natural radiation, nuclear weapons fallout, Chernobyl, medical irradiation, radioactive waste disposal and miscellaneous — mainly domestic — sources, and provides a breakdown of regional and national measurements.

The main finding of the report is the increase in the estimated average annual dose of radiation — mainly due to the re-evaluation of the dose from exposure to radon.

ECOTOXICOLOGY AND CLIMATE (SCOPE 38)

Ed. Philippe Bourdeau and others. Publisher: John Wiley and Sons, 1989. £55.00. ISBN 0 471 91831 8

SCOPE is one of a number of committees established by the International Council of Scientific Unions. This book follows from previous SCOPE studies on ecotoxicology and pays particular attention to hot and cold climates. The editors believe this publication is the first systematically to attempt to examine the principles of ecotoxicology in tropical, arid, subpolar and high mountain regions. The papers presented are an attempt to establish whether the different physical and chemical conditions in various climatic regions of the world influence the effects of environmental chemicals.

TRANSPORT AND THE ENVIRONMENT

OECD, 1988. £11.20. ISBN 92 64 13045 4

A comprehensive report of the OECD Ad Hoc Group on Transport and the Environment. It is divided into five sections and covers all aspects of the role that transport systems play in OECD countries. Environmental impact, urban transport management and emission control technologies are a few of the topics covered. It stresses the international nature of problems relating to transport and the environment and the general need for harmonisation of environmental policies, in view of the fact that both pollutants and vehicles themselves are not bound by international borders.

PLANNING POLLUTION PREVENTION

Christopher Wood. Publisher: Heinemann Newnes, 1989. £35.00. ISBN 0 434 92274 9

As a senior lecturer in planning, and co-director of the Environmental Impact Assessment Centre at the University of Manchester, Chris Wood is admirably qualified to look at air pollution and land use planning regulations. This book is based on an investigation of national and local air pollution controls and land use controls, and upon case studies of the ways in which they are actually implemented in the UK and USA. The book highlights the very different approaches to air pollution control adopted by each country — BPM in the UK and controls based on air quality standards in the US. Both systems it is felt have advantages and disadvantages, and their comparison therefore should make it possible to effect improvements. Research for the book was partly funded by the NSCA.

BRITAIN'S POISONED WATER

Frances and Phil Craig. Publisher: Penguin, 1989. £3.99. ISBN 0 14 011050 X

A paperback guide to water pollution issues — covering agriculture, lead, aluminium, hazardous waste disposal, fluoridation, industrial pollution and sewage pollution of our beaches and rivers. The book sets out to examine the 'patterns of neglect and mismanagement' which the authors believe to have brought about the deterioration in water quality. Not for the faint-hearted!

ASBESTOS REMOVAL, MANAGEMENT AND CONTROL

John Delaine. Publisher: Gower Technical Press, 1988. £25.00. ISBN 0 566 09000 7

The author, a safety practitioner with many years experience of working with asbestos, sets out to explain how asbestos removal should be controlled and carried out. It covers all aspects of asbestos handling — through legislation, procedure, equipment, handling and waste disposal.

ALTERNATIVES TO ASBESTOS — THE PROS AND CONS

Ed. A.A. Hodgson. Publisher: John Wiley and Sons, 1989. ISBN 0 471 92353 2

Aimed at researchers in asbestos-using industries, medicine, health and safety authorities and those interested in the applications of asbestos and its alternatives in the environment. The book has three chapters — discussing raw materials that can be used to construct alternatives, the feasibility of substitution and the health aspects of alternative raw materials — both organic and inorganic.

ENERGY IN THE HOME

Neighbourhood Energy Action. £7.50+£1.00 p&p. (Five copies £25.00+£3.50 p&p) ISBN 0 948371 086

In the United Kingdom nearly 30% of energy supplied is used in our homes. This 64 page booklet, with group leaders notes, has been designed for those who wish to learn more about domestic energy use and how to reduce consumption. It is specifically aimed at group leaders or those advising on energy economy. Clearly written and illustrated, it will prove informative to anyone interested in domestic energy consumption.

RAINFORESTS: LAND USE OPTIONS FOR AMAZONIA

Published by Oxford University Press/Worldwide Fund for Nature in association with Survival International, 1989. £10.50. ISBN 019 91339 5

This book comes together with a resource pack containing teachers' notes and photocopyable student resource sheets; it is aimed at A level geography and environmental studies students. The book explains the importance of the Amazonian rainforest in the ecological system and the impact of deforestation and new agricultural development. The book is dedicated to Chico Mendes, the Brazilian rubber tapper murdered late in 1988 who did so much to bring to the world's attention the extent of the devastation taking place in Amazonia.

FUTURE EVENTS

15 NOVEMBER — WORKSHOP: THE MANAGEMENT AND DISPOSAL OF HOSPITAL WASTE

One day workshop jointly run by the Centre for Continuing Vocational Education and Envirotrain.
Venue: Update Centre, University of Sheffield.
Details: Mrs. K. Wainwright, CCVE, 65 Wilkinson Street, Sheffield S10 2GJ
Telephone: 0742 768653

22 NOVEMBER — CONFERENCE: AUTOMOTIVE AND INDUSTRIAL FUEL COMBUSTION

Overview of the issues and facts regarding exhaust gases and hydrocarbon emissions which are increasingly under challenge as sources of longer term damage to public health and the environment.
Venue: The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR
Details: Miss Caroline Little, IOP. Telephone: 01-636 1004

23-26 NOVEMBER — CONFERENCE: INDUSTRIAL NOISE

Among the issues to be covered are Community response to industrial noise (including application of new BS 4142); Noise at Work (evaluation of noise dose, noise control techniques, noise induced hearing loss).
Venue: Windermere Hydro Hotel.
Details: Dr. R. Lawrence, Institute of Acoustics, 25 Chambers Street,
Edinburgh EH1 1HU

4-5 DECEMBER — CONFERENCE: ENVIRONMENTAL CHALLENGES: THE ENERGY RESPONSE

The 4th international energy conference is convened by the Royal Institute of International Affairs, the British Institute of Energy Economics, The International Association for Energy Economics. It will provide economic, political and technical analyses of the main environmental challenges facing the energy sector — acid rain, urban atmospheric pollution and the greenhouse effect — and the policy responses so far. Future options for governments and the energy industry, the implications and costs involved will also be considered.
Venue: Chatham House, London.
Details: Energy Conference Organiser RIIA, 10 St. James's Square,
London SW1Y 4LE Telephone: 01-930 2233

12 DECEMBER — WORKSHOP: ENVIRONMENTAL INPUT ASSESSMENT: IMPLICATIONS FOR WASTE DISPOSAL SITE LICENSING

All details as for 15 November workshop, above.

12 DECEMBER — ONE DAY MEETING: NOISE WITHIN BUILDINGS

This meeting will explore and discuss the guidance given in British Standard BS 8233: 1987 with respect to achieving adequate control of noise within buildings. In particular it is intended that practical solutions will be considered along with the criteria adopted and the principles and practice of noise control.

Venue and Details: Institute of Acoustics, 25 Chambers Street,
Edinburgh EH1 1HU

1990

10-11 JANUARY — ENVIRONMENT AND SAFETY CONFERENCE AND EXHIBITION

Organised by Labmate Limited, the conference will review the implementation of COSHH regulations and will also address the much broader issues of environmental control and pollution hazards. The exhibition will feature major companies operating in the fields of environmental analysis, monitoring, measurement and control; including noise and pollution control, gas detection and monitoring, laboratory safety, data processing and consultancy.

Venue: Covent Garden Exhibition Centre, Great Queen Street, London WC2
*Details:*Thames Events, Richmond Bridge House, 417-421 Richmond Road,
Twickenham TW1 2EX Telephone: 01-892 3637

15-18 MARCH — CONFERENCE AND EXHIBITION: WORLD WATCH

World Watch has been conceived as a means of bringing together industrialists and environmentalists, providing a forum for discussion of critical issues as well as a showcase for "environmentally friendly consumer products and manufacturing processes".

Venue: The Metropole, Brighton.
Details: Nicholas Brookland/Amanda McAllister, Rushman Communications.
Telephone: 01-495 6280

27-29 MARCH — WORKSHOP: TRANSPORTATION AND THE ENVIRONMENT

Road transport is an integral feature of modern life, moving people and goods for industry, commerce and pleasure, but traffic is also a social menace. Air pollution, noise, road accidents and traffic congestion are the price we pay for our increasing use of motor vehicles. NSCA's annual workshop will explore the problems, prospects for emissions control and policy options.

Venue: Newcastle-upon-Tyne.
Details: Peter Mitchell, NSCA, 136 North Street, Brighton BN1 1RG
Telephone: 0273 26313

3-5 APRIL — CONFERENCE: EFFLUENT TREATMENT AND WASTE DISPOSAL

Tightening environmental legislation and efficiency of manufacturing practices significantly increase pressures on effluent treatment and waste disposal from all sources. The conference will bring participants up-to-date with the latest developments and experience in applying traditional and novel processes.

Details: The Institute of Chemical Engineers, 165-171 Railway Terrace,
Rugby CV21 3HQ Telephone: 0788 78214

THE HEART OF THE COUNTRY

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CLEAN AIR

NATIONAL SOCIETY FOR CLEAN AIR
AND ENVIRONMENTAL PROTECTION

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THE HEART
OF THE
COUNTRY

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EDITORIAL

INTO THE NINETIES

The environment is suddenly being taken seriously, and many of us are still recovering from the shock! The new decade presents a formidable challenge to all of us who have long campaigned for environmental issues to take their rightful place in policymaking. Along with our new-found influence comes an increasing responsibility to ensure that our views continue to be founded on scientific accuracy and are presented with clarity. Welcome though the changing consciousness is, misunderstanding, scaremongering and woolly thinking are becoming endemic; we have to cut through the hype and present the facts.

Few thinking people now doubt that global pollution problems are growing with an inbuilt inevitability. Entire regions of some countries are suffering environmental devastation, whilst even in the "civilised" West major issues of local environmental quality and transboundary pollution remain. The problems have largely been identified, but the development of an effective response has barely begun.

For the UK, the "Green" Bill represents an opening skirmish in the battle for effective integration of environmental protection into national policy. NSCA has been involved in many of the consultation exercises which led up to the Bill, and has proposed some detailed amendments which will fine-tune the proposals. But the Bill does not address the major environmental issues; announcing a White Paper for the autumn, the Secretary of State promises that it will be appropriately wide-ranging. In the present climate he can be assured that we, along with other bodies, will be watching closely. Our concern will ensure that the environment becomes a thread which runs through all government policymaking, rather than an optional extra. Departments of State must speak with a common voice. This may require an identifiable body — an environmental protection commission — to ensure effective co-ordination. The arguments about such a body will be rehearsed as the Green Bill and Lord Cranbrook's *Environment Protection Bill* make their way through Parliament. Co-ordination of policy also seems certain to require the increased use of fiscal measures to encourage "greener" behaviour. Effective measures could be unpopular and even inflationary — who will be prepared to grasp this particular nettle?

Potentially even tougher prospects face us on the international stage. It is hard to perceive how less fortunate nations can simultaneously improve their environmental quality and raise living standards to anything approaching those in the West, without massive consumption of resources and energy. Whilst the industrialised nations continue to be profligate in their use of the planet's riches, and fail to protect the earth's land, waters and atmosphere, the developing world can be forgiven for its suspicions about the noble concept of "sustainable development". Different countries have differing needs; reaching international agreement about reducing greenhouse gases, for instance, will be an extraordinarily difficult process.

Despite the efforts of scientists and educators, the full political implications of global pollution have simply not been faced; unless parliamentary democracies can meet such challenges we must conclude that not only our democracies, but our civilisation, is at risk. The likely truth is that the green nineties will see significant steps in environmental protection, but if this is to be achieved equitably we must expect major changes in the economy, in regulation, and ultimately in our personal priorities. As individuals this will mean accepting major impacts on our lifestyles — and on our wallets. This may prove politically unpopular in the short term, but in the long term there really is no alternative.

WORKSHOP
TRANSPORT AND THE LOCAL ENVIRONMENT
PLANNING FOR THE FUTURE
• 28 and 29 MARCH 1990 •
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CONFERENCE ROUND UP

Mounting interest in all things green — concern about rising levels of pollution, global warming, how to implement green policies at the local level — or simply an opportunity to discuss issues of common interest with colleagues: whatever the reason over 400 delegates attended the NSCA Conference in Scarborough last October — the highest figure for many years.

Greenhouse Effect

Sir John Mason, newly-elected NSCA President, in his opening address (see this issue of *Clean Air*) drew attention to the need to separate fact from fiction in discussing global warming. He was concerned that many members of the general public — and indeed some scientists — were confused about what was actually meant by the greenhouse effect. He explained the many factors that scientists had to take into account in making predictions about global warming, and the need to improve knowledge and understanding in order to be able to give firm advice to governments on which policy could be based. He felt that despite there still being considerable uncertainty in model predictions on which potential rises in temperature and sea level were based, it was nevertheless appropriate to start taking remedial action now. For instance, to plan for sea defences which could progressively be increased as model predictions improved, diversity in crop production and so on.

An "action now" policy was also advocated by Dr. Richard Warrick (Climatic Research Unit of the University of East Anglia) and by Stuart Boyle (Association for the Conservation of Energy). Dr. Warrick said that emissions of carbon dioxide were currently increasing at about 1.5% per annum, and their concentration in the atmosphere at about 0.5%. Methane, another important greenhouse gas is more than double its concentration from pre-industrial times and is currently growing at 17ppm per year. The chlorofluorocarbons — despite the Montreal Protocol and widespread agreement of the need for them to be substantially phased out — will continue for some time yet to play an important part in the factors which contribute to the greenhouse effect. An "action now" policy was needed because of the long response time between doing something and seeing any results — only by taking strict measures now to reduce greenhouse gas emissions can we prevent substantial global warming far into the next century.

Stuart Boyle discussed the role of energy in relation to global warming and greenhouse emissions, and outlined some of the options for combatting the problem, and in particular to reduce carbon dioxide emissions. He said that some estimates suggest a reduction of between 50 — 80% will be necessary simply to stabilise climate. The three options which would give significant reductions in CO_2 were where fuel is produced using a non-fossil fuel base: producing hydrogen, and producing electric vehicles — both from non-fossil fuel electricity — and producing compressed natural gas and liquified natural gas from biomass. He suggested however that while there was much potential for reducing CO_2, market forces alone would not achieve much. There had to be policy changes — eg information, regulations, financial and tax incentives — to encourage energy savings and conservation.

CFCs

Dr. Mike Harris (ICI Chemicals and Polymers) reviewed the scientific and regulatory backgound to the CFC issue and described how industry is responding to the challenge of reducing their impact both as a greenhouse gas and in depleting the ozone layer; four strategies were of importance — conservation of the existing CFCs to reduce their use immediately, substitution by existing chemicals where possible, longer-term substitution options using new technologies, and — the mainstream solution — the introduction of new "environment-friendly" fluorocarbons. Environment studies on CFCs were started as long ago as 1972 because it was recognised that the atmospheric lifetime of them was very long. It was felt necessary to try and find out what happens to CFCs when the general public have finished using them, because most of their uses do involve emission into the atmosphere.

The environmental goal now widely accepted is the achievement of a level of two parts per billion of chlorine in the atmosphere; however even with the most stringent option — total and absolute elimination of CFCs — this will take until the middle of next century to achieve.

Dr. Harris said that many uses of CFCs can be dealt with using existing chemicals, and that equally a large part of the market can be dealt with using new technologies. however, something like a third of the market requires the use of new chemicals, and the only chemicals known today which present the right array of properties and environment friendliness are variants on the fluorocarbon theme. Expressing this in terms of ozone depletion potential, where the Montreal substances are at the top, the alternatives fall into the middle ground; some have no ozone depletion potential, others have a small ozone depletion potential. He reminded delegates that chemistry cannot be invented overnight.

The chlorofluorocarbons are also going to make a significant contribution to greenhouse warming for some years to come, simply based on those already in the atmosphere, because their atmospheric lifetime is so long. Up to the year 2030 they will still be representing 10% — 15% of the problem, even though they will have been phased out by early next century.

In the discussion which followed, delegates recognised that the possible consequences of the greenhouse effect meant that it could not be ignored. And while there were a number of initiatives which could be taken locally — eg reduced dependence on fossil fuels, recycling or safe disposal of CFCs — these would be of only limited benefit if similar action were not taken worldwide. The real problem which had to be addressed was how to encourage the developing and other economically disadvantaged countries to take similar and in some cases more drastic measures to reduce pollution. For many, cleaning up their industries and using CFC substitutes were expensive options. There was a need to ensure aid was better targetted to enable the countries to look forward to economic growth on the one hand and protection of the local and global environment on the other.

Vehicle Emission Controls

With increasing attention being given to the contribution of vehicle exhausts to atmospheric pollution, and in the case of diesel engines, recent concern that they might pose a health hazard too, the situation reports session was of particular interest. Edward Betts (Esso Research Centre) reviewed current and future developments in diesel and gasoline fuel and their impact on improving exhaust and evaporative emissions, and the options for control using carbon canister technology. Dr. Sonja Boemer-Christiansen (University of Sussex, Science Policy Research Unit) looked at European Community measures to control vehicle emissions and the reasons why it had taken so long to reach agreement on this. In the discussion which followed delegates were concerned that in addition to developing new technologies to meet stricter emission limits, there had to be better controls covering existing vehicles on the road — one solution might be to introduce an emissions test into the annual MOT.

Radon

While it is often the implications of global warming that captures media interest, so far as the conference was concerned the dangers of radon gas in homes was the focus of attention. Following presentation of his paper detailing results of surveys carried out by the Institution of Environmental Health Officers, Alan Blythe (Woodspring DC) spent a considerable proportion of the rest of the week being interviewed by journalists up and down the country!

Alan Blythe referred to surveys of local authorities which had shown that the existence of radon is rather more widespread than had previously been thought. Radon is a radioactive odourless gas which occurs naturally in rocks such as granite, and can move readily through porous rock and soil and seep into buildings where dangerous concentrations can be accumulated. It is thought to be the second most important cause of lung cancer after smoking and to be responsible for an estimated 2,500 deaths annually in the UK. Higher than average radon "hot spots" had been found in parts of Cumbria, Staffordshire, Mid-Glamorgan and the West Midlands, as well as Cornwall and Devon. The IEHO want a 50% reduction in the action level, and an extension of house renovation grants to cover all dwellings above the action level.

Jon Miles (National Radiological Protection Board) said that the NRPB was carrying out surveys in various areas of England known to have high levels of radon in homes. While agreeing that radon could be responsible for many deaths from lung cancer, he also emphasised the need to extend monitoring and research. As the programme of surveys becomes better established, it would become more appropriate to review the action level in the light of the more comprehensive information on the extent of homes with radon hotspots above the current action level. (A 50% reduction in the action level has since been recommended by the NRPB.)

Smoking Policies at Work

A different form of indoor air pollution — and one that is noticeable without the aid of sophisticated monitoring equipment — is that caused by cigarette smoking. According to Mark Flannagan (Action on Smoking and Health) almost two-thirds of the population are now non-smokers and almost 79% of companies have some no smoking areas. However, it is often at the workplace that the risk to health from cigarette smoke is greatest — people are confined for prolonged periods in enclosed spaces. It is for this reason that ASH has set up a new consultancy service — ASH Workplace Services — to help employers implement workable smoking policies. He said that while people often talked about the rights of non-smokers to breathe smoke-free air, it was important to bear in mind that many smokers are also happy with no smoking policies, including bans on smoking on public transport.

Neighbour Noise

The sensitive subject of neighbour noise was tackled by Geof Kaufman (Environmental Health Officer, Tameside BC). He said that complaints to EHOs had risen alarmingly since the mid-1970s: in 1975, 6,325 complaints were made about 4,793 sources of which 2,669 were considered to be noise nuisance. By 1985/86 this had risen to 56,414 complaints regarding 35,636 sources of which 17,780 were considered to be nuisance. Of those 17,780 nuisances, an abatement notice was served on less than 9%. This rising number of complaints means increasing pressure on local authorities, and there is a need to clarify the interpretation of s57 and s58 of the *Control of Pollution Act 1974.* The fact that many noise nuisances take place outside office hours poses a particular resource problem for EHOs.

Local authority delegates agreed that there was an urgent need for clarification of local authority powers and the *Control of Pollution Act,* and indeed a need for more effective and enforceable legislation covering noise; there was also concern that even when there was a prosecution, particularly for a noisy party, the fine was usually totally inadequate in relation to the nuisance caused. NSCA's working group on neighbour noise has been looking at the extent of the problem and will be producing a new advice leaflet on the subject and a discussion paper on possible solutions. The Government has also recently announced that it is reviewing noise control legislation; NSCA will of course hope to contribute to that review.

Traffic Noise

Also on noise, George Vulkan (London Scientific Services) described practical measures to reduce the effects of traffic noise. Already the number of vehicles on the roads has increased to 23 million with predictions for the future indicating further substantial growth, requiring yet more miles of new or widened roads to accommodate them. In some areas this is already having an impact on residential and other noise sensitive areas. Noise barriers, lorry bans in inner cities during the night, better public transport and rail systems for the transport of freight were all possible ways to mitigate the effects of noise. Many of these points will be discussed in detail at NSCA's

Spring Workshop (26-28 March), which will also look at road pricing.

Low Frequency Noise

The problem of low frequency noise — often described by sufferers as a vibration or a hum or simply as a noise that is always there — affects many more people than is realised; for sufferers this can mean a feeling of irritation, unease, headache or even heart palpitations. However, because of the difficulty in adequately defining or describing low frequency noise, and the fact that there is no conclusive evidence that it is directly harmful to people, little attention has been given to doing anything about it. In defining low frequency sound as around 20 Hz — 261 Hz, Hylton Dawson, Chairman of NSCA's Noise Committee, suggested that more needs to be done to draw attention to the problem. Action included negotiating for a change or addition to recognised noise standards to deal with LFN, and to press for legislation to control both low frequency and infrasonic noise emission. Improved design, better silencing, active noise suppression, and a convenient measurement unit will all play their part in controlling the problems associated with low frequency noise. NSCA will be producing a fact sheet based on Hylton Dawson's paper.

Waste Disposal

The penultimate session looked at the changing face of waste disposal. Papers on recycling, landfill and incineration aroused considerable debate on the environmental effects of the different disposal options for the estimated 30 million tonnes of municipal waste we produce each year.

Mike Woodfield of Warren Spring Laboratory suggested that incineration still has a good future once the old plants are phased out under pressure from the EC Directive on Municipal Waste Incinerators. There would no doubt be some operators who would switch to landfill rather than upgrade existing plant; however, he said, there were nevertheless strong indications that conditions will become more conducive to the growth of a new generation of plant able to exploit the energy potential of the wastes. The new plants, and those remaining older plant, will be highly sophisticated and will require careful management. This would place increasing demands on traditional operating bodies and possibly lead to an increase in private sector involvement both in the financing and operation of plant.

About 90% of household and commercial waste in the UK is landfilled. David Mills (Aspinwall and Co.) reviewed the progress which had been made in this method of disposal; well defined and enforced legislation and advancing technology would help to ensure that landfill sites did not pose any pollution problems. Despite these assurances, some local authority delegates were concerned that as current landfill sites became full, they would have problems of acquiring suitable replacement sites; there was also a problem in convincing local citizens that properly managed landfill sites would not pose any dangers.

With a duty on councils responsible for waste collection and disposal to prepare recycling plans included in the *Environmental Protection Bill* now before Parliament, Mike Flood's paper on the potential for recycling provided useful background. He said that the landfilling and incineration of much of the refuse represented a colossal waste of natural resources — if all of the paper, glass, plastic, metal and other items which have market value could somehow be separated out and sold, they would raise over half a billion pounds. However, he warned that the current fashion for setting up recycling schemes could in fact have a detrimental result — such schemes should be developed carefully and only where it makes sense.

Local Initiatives

This point was confirmed by Geoff Wright (Leeds City Council) who said it was essential to work closely with industry to ensure the local authority was not collecting materials for which there was no market; it was also important to site recycling facilities at locations people regularly visit — eg schools, shopping centres and community centres. Leeds has now had a recycling scheme for waste paper, office paper, glass cans and PET bottles for 12 years. The City Council is responsible for the operations with the project being administered by a registered charity (the Leeds Recycling for Charity Committee. £232,000 has been raised for local charities).

Two other papers — from Les Reason (Kirklees MBC) and Ken Whitehead (Harlow DC) — described green initiatives taken by their Councils. Kirklees had had an "environmental audit" carried out in conjunction with Friends of the Earth. This had helped to identify the environmental "health" of Kirklees and suggest areas where further monitoring or changes in practice might be of benefit. In Harlow, the emphasis had been on promoting energy efficiency: initiatives included simple measures from draught proofing the town hall windows to changing the heating system at the municipal swimming pool which allowed more flexibility. Much attention has been paid to raising the awareness of both the general public and council staff of the importance and benefits of energy efficiency measures. In particular, to encourage staff involvement an awards scheme has been set up for staff whose energy saving suggestions are put into practice.

Conference Proceedings

All the papers presented during the conference are now being finalised for publication and will be sent to delegates. For others, the cost of the full set of papers will be £16.00, with single copies at £2.00 each.

BRIAN PONSFORD

NSCA was very sorry to learn of the death in November of Brian Ponsford, Director of HM Inspectorate of Pollution. As members will recall, he had the very onerous task of creating a unified Inspectorate out of four previously separate and independent bodies embracing quite different disciplines. We extend our sympathy to his wife and family.

PRESIDENT'S ADDRESS

THE GREENHOUSE EFFECT: A SCIENTIST'S PERSPECTIVE

SIR JOHN MASON, CB, DSc, FRS
PRESIDENT, NSCA

Interest in and concern with climate, climatic change, and the effect which man may have on the climate, particularly through the greenhouse effect, has reached an enormously important and crucial stage in the last year or two.

Twenty years ago nobody even discussed the climate: they were interested in weather, but were not particularly interested in the climate which was regarded as pretty well constant. However, in the last few years that picture has changed dramatically; these questions are now very high up on the political agenda of the nations of the world and in this country too. Indeed a few months ago the Prime Minister held a seminar at 10 Downing street on the greenhouse effect, attended by many of the Cabinet. So I thought that I would like to address you on the greenhouse effect because it is a very complex scientific subject as well as having great economic and political impact; there has also been much misunderstanding about it and a good deal of distortion of the scientific evidence and of the implications.

I think the public and even a good many of my scientific colleagues are really very confused about what we understand about the greenhouse effect — how good present predictions are and what we might do to improve them. What I hope to do is to separate fact from fiction and to give you an independent scientific viewpoint of what we actually know and understand about the greenhouse effect. What are the nature of the predictions we are able to make, what reliance can we place upon them and what have we to do in the future to improve our knowledge and understanding, in order to be able to give firm advice to Governments on very major policy issues? For example, major changes in energy policy will be matters of enormous economic and political significance and will affect every one of us, because at the end of the day we will all have to pay the bill.

First of all, let me remind you that, if it was not for the greenhouse effect, none of us would be here — indeed this would be a cold and lifeless planet; so let me begin by trying to explain what the greenhouse effect is.

The climate as we know it and the weather are determined by what happens in the atmosphere and the oceans; it involves what happens with the great ice masses, the sea ice, the land ice and the glaciers; to some extent and in the longer term it is also affected by the biology, by the trees and the vegetation on land; the plankton in the oceans also play a very important part, for example in controlling how much carbon dioxide we have in the atmosphere. It is an enormously complex system involving physics and chemistry and biology, extending over the whole range of sciences.

The whole climate system is driven by the heat from the sun; the amount of heat that comes in to the top of the atmosphere on average is 340 watts on every square metre. When the sunlight irradiates the top of the atmosphere and travels down through the atmosphere, some of it is reflected straight back to space by clouds. Some is absorbed in the atmosphere itself by the dust and the air and only about half actually gets down to the earth's surface. Of that, some is reflected back to space, but most of it is absorbed by the earth and the oceans and thus warms them up. They then re-radiate some of this heat back again — not as the visible radiation which you see from the sun, but as low temperature infra-red radiation like you get from a fire, and that infra-radiation goes back into the atmosphere.

Carbon dioxide and water vapour — two of the greenhouse gases — absorb infra-red radiation emitted by the earth and send it back again to the earth and warm it up. If there were no carbon dioxide and no water vapour in the atmosphere, the average surface temperature of the earth would be -19 degrees centigrade. It is actually +15 degrees, so there is 34 degrees of warming caused simply by the greenhouse gases carbon dioxide and water vapour absorbing this infra-red radiation from the ground — that is the greenhouse effect.

The amount of heat which the carbon dioxide and water vapour radiate back to the earth's surface is 150 watts per square metre, of which about 100 watts comes from the water vapour and 50 from the carbon dioxide; another way of looking at it is that there would be 150 megawatts on every square kilometre.

If we double the amount of carbon dioxide, we should actually only increase the amount of heat from the atmosphere to the earth by 4 watts per square metre, that is by 2.5%, which is a very small change but one which may have quite large effects. To measure or even calculate these small changes of a few per cent with the required degree of accuracy is almost impossible and that is one of the problems now facing us. However, there is no question at all that the amount of carbon dioxide is increasing and most of that increase is coming from the burning of fossil fuel; the amount of carbon dioxide in the atmosphere has increased by 27% since 1860 — somewhere in the middle of the Industrial Revolution. At the moment carbon dioxide is increasing at the rate of almost exactly 0.5% per annum; at the beginning of the century the rate of increase was only 0.1% per annum, so now it is not only increasing but at an accelerating rate. The rate at which it increases in the future will be determined by several factors, with the rate at which we continue to burn fossil fuel of particular importance since about 90% of global energy supply comes from fossil fuels and wood: about 41% comes from oil, 17% from gas, 24% from coal, 14% from wood and biomass, 2% from nuclear and 2% from hydro-electricity.

Fortunately, however, not all the man-made carbon dioxide we put into the atmosphere by the burning of fossil fuel remains there, about half of it is absorbed by the oceans — by the plankton. The phyto-plankton in the oceans take up the carbon dioxide and convert it by photosynthesis into organic carbon; this is then eaten by the zoo plankton and the fish, and converted into skeletal tissue, which together with the faeces from these organisms rains out and falls to the bottom of the ocean as inorganic carbon. Vast quantities of carbon are locked up in the sediments of ocean, in the rocks and in the water itself. Thus the oceans are an important element in controlling the greenhouse effect. They also take up a good deal of the additional heat released by the greenhouse effect, which is a very important factor too.

If the amount of carbon dioxide in the atmosphere were to continue increasing at the rate of 0.5% per annum it would reach double its pre-industrial value by about 2080 and double its present value by 2130 AD. In fact it is likely to increase above these values particularly if the world population goes on increasing. In 1958 when we began making very detailed measurements of carbon dioxide in the atmosphere, it was about 315 parts per million; it is now 350 parts per million. All the signs are that the amount of carbon dioxide in the atmosphere will certainly double between now and sometime towards the middle or end of the next century: if consumption goes on increasing at the present rate of 2% per annum and half of it still remains in the atmosphere we shall reach 600 parts per million by the year 2060, seventy years from now. Of course if we burn more fossil fuel at a higher rate we shall reach there earlier.

In the last few years we have realised that there are other greenhouse gases that man puts into the atmosphere besides carbon dioxide; these include methane, nitrous oxide and CFCs. At present they are present in minute concentrations compared with carbon dioxide — methane is about 1,750 parts per billion, and nitrous oxide about 300 parts per billion, which is a factor of 1,000 lower in concentrations than carbon dioxide. CFCs are present in only 600 parts per trillion, so there is only about one millionth as much CFC in the atmosphere as carbon dioxide. However, although they are only present in such tiny concentrations the fact is that these other gases absorb the infra-red radiation much more powerfully than carbon dioxide. One molecule of CFC for example, will absorb as much as 10,000 molecules of carbon dioxide. They are very strong absorbers of the infra-red radiation, and they are also increasing like carbon dioxide: methane is going up at 1.3% per annum, and nitrous oxide at 0.3% per annum. At the moment, carbon dioxide is responsible for about 66% of the greenhouse warming, methane about 20%, nitrous oxide about 4% and the main CFC gases about 10%. Already therefore the other trace gases are responsible for about half as much again of the heating as carbon dioxide, — carbon dioxide is responsible for two-thirds, and the others together for about one-third. If we had continued to use CFCs as we were a few years ago, the contribution of CFCs to global warming would eventually have become quite high. The impact of the Montreal Protocol which was agreed in 1987 and which aims to reduce CFCs by about 50% by the end of this century, means that they will have less effect; even so they are likely to contribute nearly 10% even at the end of the century and well into the next; if they were banned altogther by the year 2000, then their contribution to the greenhouse effect would by, say, the year 2060, be only 3%. So, while they do make a substantial contribution, they are not the major contributor, and not likely to be. However, it does seem that these trace gases are likely to contribute together about one-third of greenhouse heating, with carbon dioxide accounting for two-thirds. It is also important to remember that if you warm the atmosphere by the greenhouse gases that will mean that more water vapour will be evaporated from the surface of the oceans and the land surface. This will increase the water vapour in the atmosphere and thus magnify the overall affect, and so the water vapour will almost double the effect of the other greenhouse gases.

I mentioned earlier that carbon dioxide had increased by 27% since 1860 which on the basis of a simple calculation, should have resulted in an increase of temperature of about a quarter of a degree centigrade; I also said that there would be additional heating from the extra water vapour, and that would mean that the 27% increase in CO_2 should on the basis of a simple calculation produce a rise in temperature of half a degree. Some scientists conclude that because the average global temperature has risen by about half a degree since 1900, the greenhouse effect is upon us, and has already started.

A glance at a temperature record from 1900 until present day shows the global average air surface temperature taken from observations all over the world, both on land and from ships. From this it could be seen that from 1900 to 1940 there was a steady increase of about 0.3° C between 1900 and 1940, and from 1940 to the very early 1970s there was a very small fall in temperature, only 0.1-0.2 of a degree; in recent years it has been increasing again and indeed the last few summers have been the warmest on record, and I suspect 1989 will also prove to have been a very warm year. This too might lead one to think that is very good evidence of greenhouse warming. However I don't believe that record shows any such thing, and I will now explain why.

Most of the warming took place between 1900 and 1940 when CO_2 was increasing very slowly, at only 0.1 per cent per annum only one-fifth of the present rate; this was followed by a cooler period from 1940 to the beginning of 1970. Although that cooling was not very much, many of you will remember that 15 years ago we were told that this was the start of an imminent ice age! The media was as full of the next ice age as it is now of the greenhouse warming; indeed the BBC mounted a two-hour programme in 1974 to convince us all that we were going to have a rapid ice age. This was all based on a little tiny drop in temperature over 25 years and the confident assumption that it would keep on plunging down into an ice age.

I believe that the temperature record of 1900 to the present day is a record of the natural fluctuations — it shows how much the yearly values vary about the average curve; there are groups of cool years and groups of warm years. Of course if the trend continues persistently, then we shall believe that the greenhouse effect has started. At the moment, however, I believe the greenhouse signal is too small for us to measure and for it to be distinguished from natural fluctuations of temperature.

But there is a more underlying reason for believing the greenhouse effect has not yet reached a detectable level. This is because, as I shall explain later, much of the heat is stored in the oceans which act just like a gigantic flywheel — they have an enormous thermal capacity enabling them to store heat and release it only very slowly; the oceans will therefore delay the greenhouse effect and indeed are delaying it, in my view by as much as 20 or 30 years. But while the oceans delay the onset of the greenhouse effect, they will also continue to release heat and prolong the greenhouse warming long after we have reduced the emissions of carbon dioxide along with the other greenhouse gases.

Why are we so concerned about the greenhouse effect when we cannot see it, cannot detect it, and nobody actually feels any effect of it? At the World Climate Conference in 1979 all these problems were discussed. We identified that the single biggest potential man-made threat to the future climate of the world was increasing carbon dioxide enhancing the greenhouse effect. It has taken ten years for governments to get that message. That prediction was made entirely on the basis of using mathematical models of the climate; the very first simple calculations were made in about 1974 but more sophisticated models have been used since then. There are four major modelling groups in the World who can do this work, three in the United States and the UK Meteorological Office who alone have the scientific knowledge and computing power required to make this kind of prediction. We are still though, entirely dependent upon model predictions. If we are going to have to wait 10, or 20 or 30 years for the greenhouse effect to appear so that we can actually measure and detect it and be sure that it is there above the natural variability, this puts us in a difficult position. In order to give advice to governments over the next two or three decades we have to rely almost entirely on the predictions of models. At the moment the difference between the predictions of the different models are too large for us to be able to give confident advice to Government as to what is going to happen in the future.

The actual model predictions for the average surface temperature of earth due to doubling the carbon dioxide vary between 1.5 degrees to 5 degrees at the moment, and that's too big a divergence. The economic and social effects of a 5 degree warming, bearing in mind that it will be twice if not three times greater in the Polar regions would be much greater than a 1 degree change. We have to narrow that range of uncertainty in order to guide very important policy decisions.

Let me now describe very briefly the principles involved in the building of climate models and how they operate. We can describe what happens in the atmosphere and to some extent in the oceans, in terms of a set of mathematical equations which are really the laws of physics, Newton's laws of motion, equations of thermo-dynamics, the equation of radiative transfer, equations to describe how clouds and rain are formed, the evaporation of water from the surface of the earth, and hydrological cycle; all these are written down and described in terms of mathematical equations; we start with the observed status of the atmosphere at some particular incidence of time and then we solve these mathematical equations to calculate what is going to happen in the future.

The model at the Met. Office divides the atmosphere into thirteen different levels between the ground and 100,000 ft, with 30,000 points at each level — a third of a million points in all — and at these points, every twenty minutes, it calculates the following: the East-West and North-South components of the wind; the vertical component of the wind; the surface pressure; the surface temperature; the humidity of the air; how much rain or snow; the land surface temperature; the amount of moisture in the soil; the depth of the snow; the extent of the sea ice; the depth of the sea ice; the ice surface temperature; and the sea surface temperature.

To calculate all these variables, at 20 minute intervals, for just one day, involves a million, million numerical calculations on the computer. To simulate the changes for one whole year takes about ten hours on the fastest computer now available; however we need to have an even more detailed model of the atmosphere than this, and even more important, we have to have a model of the oceans linked to the atmospheric model and interacting with it in a very intimate way. At the moment we only look at the first 100 metres of the ocean but we don't actually calculate what happens in the deep oceans.

Predictions from a recent Met. Office model, presented as a series of maps, show what may happen to the world's climate if the carbon dioxide content of the atmosphere eventually reaches double its present value. In this case, the mean annual air temperature near the ground, averaged over the whole globe, is predicted to rise by 5.2 deg C. However, the warming is not uniform but varies considerably with latitude being about 4 deg C in the equatorial regions, about 5 or 6 deg C in middle latitudes, and as much as 12 deg C in polar regions in the local winter, but much less (2 or 3 deg C) in the polar summer. The temperature rise increases with increasing height in the lower atmosphere but actually falls in the lower stratosphere, which is cooled by the increased carbon dioxide. (This, incidentally, will slow down the destruction of ozone in the stratosphere — a modest bonus!) The maps also show some variations of greenhouse warming with longitude, with a tendency for greater warming over the continents than over the oceans.

The predicted changes in precipitation (rain and snow) show ever greater variations. On average, the global precipitation increases by 15%, but the increases occur mainly in high latitudes and along the tracks of the depressions in middle latitudes, while there is a reduction in rainfall in the sub-tropics in December, January and February. Earlier melting of the snow cover and exposure of the soil to higher temperatures, leads to a reduction in soil moisture in middle latitudes in summer. One concludes from these results that predictions of overall global changes are of very limited value because there are likely to be large regional and seasonal variations that are of much greater significance in respect of their impact on agriculture, forestry, water supplies and so on. A substantial reduction in rainfall or soil moisture would have a much more serious overall effect on the breadbaskets of the world than a similar percentage change in tundra or desert regions. We therefore have to improve the models' predictions to achieve greater consensus between the models, before we can be confident about estimating their impact on various sectors of the economy in different parts of the world.

The models are also very sensitive as to how one represents and treats some of the complicated physical processes, especially the formation of clouds. The Met. Office model is the only model which actually predicts the cloud; most other models predict the rainfall but assume that all the moisture falls out and does not leave any cloud behind, but then look at the satellite pictures which observe the cloud every day and put in the amount of cloud as observed from the satellite into the model.

The Met. Office model now incorporates a system for actually calculating the cloud — its area, its level, whether it consists of water drops or ice crystals. This is very important because the constitution of the cloud and its height determines how much of the radiation either coming from the sun or coming from the ground is absorbed, radiated or reflected by the clouds. The clouds therefore play an enormously important role in controlling the heat exchange between the atmosphere and the surface of the earth. As a result of actually putting in this highly sophisticated, but by no means perfect treatment of the cloud, the Met. Office have reduced their prediction from 5.2 degrees average warming due to the doubling of carbon dioxide to only 1.9 degrees, which is really a tremendous change. This shows just how sensitive the model predictions are, and it looks as though we have a very difficult time ahead of us in improving these models. The hope must be that the four big modelling centres — and maybe there will be one or two others in time — will go on improving the models, improving the physics in the models, and increasing the detail. Above all, we shall need much better observations, because we hardly have adequate observations from the atmosphere, and very few from its oceans.

There are large areas of the World, in Africa and some other developing Countries, especially the oceans, where weather observations are worse now than they were twenty years ago. So far as the oceans are concerned, we have very few observations at all, because satellites cannot penetrate beyond the surface of the oceans. They can only see what happens at the surface, which is nevertheless extremely valuable. We can use satellites to measure variations in the height of the oceans surface with an accuracy of only a few centimetres; from this we can calculate the winds, the waves, the stress which the winds exert on the oceans, and the ocean currents near the surface; and we can measure the actual surface temperature of the ocean quite accurately.

Part of the World Climate Research Programme involves a big experiment called *The World Ocean Circulation Experiment*; this will start in 1990 and continue for at least five years. We hope to collect data from ships, submarines, and satellites etc around the world over the next five years at least, which will give us a detailed observational programme of what is happening in the oceans, both at the surface and at depth. We can then include the observations in the ocean models which the Met. Office and others are now building to link to the atmospheric models. I am quite certain in my own mind that while we understand the basis of climate, we shall not be able to predict accurately what is going to happen in the future, or what the effect of man's influence on the climate will be until we are able to model the atmosphere, oceans and the ice masses as one integrated and interactive system. We need the observations to put into the models, to test them, and also to actually measure and monitor what is happening, so that when the greenhouse warming become detectable, we shall be able to measure it and see how it progresses during coming decades. It is vital that extra resources are found for the modelling and for the observations, in the hope that as the different models improve, the answers will get closer and instead of having a divergence of 1.5 degrees to 5 degrees, all the models say it's between 2 and 3 degrees or whatever the answer may be. If they all reach similar results we shall then have much more confidence in the predictions to guide Governments in making their policy decisions — but that is going to take another ten or twenty years.

So what can we do in the meantime? Take the sea level; we read that in fifty or seventy years time, maybe much of the Antarctic may melt and the sea level will rise by up to 15 ft; this is most unlikely — it is very hard to melt ice in the Antarctic because the temperatures are so low, and even if they were raised a bit by the greenhouse effect, you can't melt much of the Antarctic ice although it is easier to melt ice in the Arctic in the Summer.

The best current estimates are that since about 1860, the sea level has risen 12 cm, of which about 7 cm is due to the melting of glaciers and the small ice caps, whilst the

Greenland ice sheet has contributed about 3 cm. In Antarctica, because of increased snow fall, they believe ice mass has increased leading to a fall in the sea level by 3 cm, so the Antarctic and Greenland roughly cancel each other out; 5 cm rise in sea level comes from the fact the water has got a bit warmer and has expanded. Assuming the temperature due to the greenhouse warming will have increased by 2 degrees by the year 2050, the best estimate is that the melting glaciers will contribute to about 13 cm, the Greenland ice sheet about 5, Antarctica about -5, (these two roughly cancel each other out), the expansion due to the water about 17, so altogether the rise of sea level if the air temperature rises by 2 degrees by 2050, will be about 33 cm, which is substantial, but is a lot different from 5 metres!

If we extrapolate to the year 2100, when the temperature rise due to carbon dioxide is, say, 4 degress, then the increase in the rise in sea level will be about 66 cm. Those calculations however contain so much uncertainty and so much error, that the errors involved in the calculations are almost as big as the predicted values themselves. So the potential rise in sea level is something to worry about, but it is not as catastrophic as some of its more alarmist statements would have us believe.

But in the meantime there are things we can do. We currently spend £100 million a year in the UK on coastal defences and it would be perfectly possible to design a system of coastal defence, which one would implement on an incremental basis in the decades ahead, and in phase to match the perceived threat as the model predictions improve; you don't have to build against 33 cm or a sea-level rise of 66 cm all at once. You would build your sea defences progressively and either speed them up or slow them down in the future, depending on the model calculations and the actual measurements. In agriculture, there is potential for plant breeding and genetic engineering; one should spread the risk in agriculture, have much more mixed farming, produce new species of plants and crops, of which some would be more drought resistant, and some more frost resistant; others would be bred to use less water, or make greater use of the increased carbon dioxide and so on. There are a whole range of defensive strategies, adaptive strategies we should be developing in order to adapt our farming and forestry, and energy policy, and coastal defences for implementation if and when required .

So at the moment we have to use the model calculations to guide us as to what the possibilities are in the future. My belief is that we shall be able to improve those predictions over the next ten or twenty years, to a stage that we shall have much more confidence in them. Even in these crude model calculations, we can see that the temperatures and rainfall changes are not going to be the same everywhere — they will vary greatly in space and in time; there are going to be strong regional and local variations, that will be difficult to predict.

But it seems to me that we have a very exciting and challenging task ahead to study and predict changes in the world climate and their impact, bearing in mind all the time we are looking for really quite small changes. It is one of the most exciting problems in the whole of science — and something in which, I am proud to say, the UK is in many respects a world leader.

This address has been transcribed and edited from a tape recording.

NSCA BRIEFING

ENVIRONMENTAL PROTECTION BILL

The first major piece of environmental legislation since the *Control of Pollution Act 1974* was finally published on 20 December 1989. The *Environmental Protection Bill* was much as expected, with provisions for integrated pollution control, waste disposal and the reorganisation of the Nature Conservancy Council forming a substantial part of the Bill. Other measures provide for amendment of the law on statutory nuisance, of the *Radioactive Substances Act 1960,* stiffer penalties for litter and new legislation on genetically modified organisms.

Overall, the Bill gives many broad ‘enabling’ powers to the Secretary of State, but there is precious little detail about how some of these powers will be exercised. As a result, the Bill commits the Government to doing surprisingly little immediately — other measures will be introduced later when the detail has been worked out following further consultation. Examples: national emission reduction plans; the level of information to be included in authorisations: cost recovery charging for local authorities. NSCA will be seeking assurance that implementation of the Bill will not be delayed as was the case with some sections of the *Control of Pollution Act 1974.*

The second reading of the bill — when MPs debated its general aims and philosophy was on 15 January; the Bill began its Committee stage on 23 January when MPs started the process of going through the Bill clause by clause. NSCA has been providing briefing materials to MPs from all parties and will be lobbying to ensure that the Bill when enacted will provide real improvements to the control of pollution in the UK, and indeed that the enforcing authorities are adequately resourced.

On the following pages we summarise the main provisions of the *Environmental Protection Bill,* and NSCA’s views.

Part I: Integrated Pollution Control and Air Pollution Control by Local Authorities

Part I of the Bill introduces a new system of integrated pollution control (IPC) for industry which covers all major emissions to air, land and water simultaneously. In cases of releases to more than one environmental medium from processes under central control, the enforcing authority is to set conditions to ensure that the best practicable environmental option is secured to minimise pollution to the envrionment as a whole. Where there may be releases to controlled waters, an authorisation is not to be granted if the National Rivers Authority certifies that it would result in a failure to achieve a water quality objective; the Authority is also to have power to set conditions in the authorisation relating to such releases.

The new system which will not apply in Scotland will for the first time require a person proposing to operate a specified ("scheduled") process to obtain a prior authorisation from HM Inspectorate of Pollution (HMIP) containing specific conditions which must be met in carrying out that process. The conditions will prevent or minimise the release of the most potentially polluting substances and require all substances that are released to be rendered harmless. The operator must use the best available techniques not entailing excessive cost (BATNEEC); this replaces the requirement to use best practicable means (BPM) — for so long the basis of industrial pollution control in the UK. It is noteworthy that the Bill uses the word *techniques* rather than *technology* (which is favoured in EC Directives), implying the use of both the best means *and* technology to limit pollution.

Part I of the Bill also provides new powers for local authorities over air pollution from a second tier of less polluting processes. Working within parameters laid down by the Secretary of State, local authorities will only permit processes to operate after imposing conditions necessary for proper pollution control. Provision is made for schemes for fees and charges to be set up in respect of authorisations by both HMIP and local enforcing authorities. A cost recovery scheme in respect of HMIP work was the subject of a Government consultation paper in 1988.

Part II: Waste on Land

The subject of a consultation paper last year, Part II of the Bill will build stricter, and extended controls into the existing system of licensing. Responsibility for waste will rest on the person who produces it and everyone who handles it, right through to final disposal or reclamation. Only "fit and proper" persons will be allowed to run waste sites. Operators will have to care for their sites until all risks of gas or pollution are past. The Government will also take powers to control international shipments of waste.

Part II also reforms local authority responsibilities for waste. In England and Wales, local authorities' own waste disposal operations will be set up as competitive arm's length companies so as to separate them from their other job of policing environmental standards. In Scotland district and island councils are to retain their waste disposal functions. Waste regulation authorities will both be made more locally accountable and more closely supervised by HM Inspectorate of Pollution.

Part III: Statutory Nuisance and Clean Air

The law on abatement of statutory nuisances, including the abatement of noise nuisances will be consolidated and updated, and local authority procedures for the abatement of nuisance simplified and streamlined. New powers will be given to local authorities in England and Wales to take action in anticipation of statutory nuisance occurring. The definition of statutory nuisance will also be clarified. There is also provision for Regulations to be made to extend controls over smoke, grit, dust and fume emissions to specified gaseous emissions.

Part IV: Litter

Stiffer penalties are proposed for people convicted of dropping litter, and district and borough councils will be given the power to operate fixed penalty schemes. The proposals include a new duty on local authorities, educational institutions, certain statutory undertakers and landowners of some other land to keep their public land clear of litter.

Part V: Amendment of Radioactive Substances Act 1960

Part V of the Bill amends the *Radioactive Substances Act 1960* (RSA) by which the keeping and use of radioactive materials, and the accumulation and disposal of radioactive wastes are controlled. In particular it will remove the current exemptions enjoyed by the UK Atomic Energy Authority and by Crown premises.

A cost recovery charging scheme for registrations and authorisations under the RSA will be introduced. Local authorities will be required to keep and make available public registers of information subject to certain restrictions. Additional powers will be introduced for the issue of immediate enforcement and prohibition notices where registrations or authorisations are being contravened or where there is a risk of environmental harm.

Part VI: Genetically Modified Organisms

Part VI provides for safeguards against the import, containment and release of genetically modified organisms (GMOs) to the environment and for a system of consent for notification, assessment or consent for operations with GMOs. There is a new general duty of care on those using GMOs to prevent significant harm to the environment; a requirement for notification to and authorisation by Government of proposed uses; and appropriate enforcement arrangements. A unified system of administrative control, involving the Department of the Environment, Health and Safety Executive (HSE) and other interested departments, will be developed hand in hand with these provisions, providing a “one-stop shop” for those proposing to use GMOs.

Part VII: Conservation and Countryside

It is intended to split up the Nature Conservancy Council into three regional agencies based in Scotland, England and Wales. In Wales, the responsibilities and functions of the Nature Conservancy Council and the Countryside Commission will be combined into one single body to be called the Countryside Council: a similar merger is planned in Scotland under further legislation. The Bill establishes a Joint Committee of the three new agencies to cover scientific standards and advice on wider nature conservation matters which affect the whole of Great Britain or the UK, and European and international commitments for wildlife.

Part VIII: Other Controls on Waste

Part VIII provides for new enabling powers over the storage and disposal of hazardous chemicals. In addition existing powers over the importation, use and supply of hazardous chemicals will be re-enacted and extended. There are new powers governing dumping at sea. It will become an offence for any vessel (UK or foreign) to dump at sea without a UK licence anywhere within UK continental shelf waters.

Additional Proposals

The Government also proposes to introduce at a later stage provisions which will:

(a) introduce further controls over chemicals to form a legal framework for the systematic evaluation of potentially harmful effects of industrial chemicals on human health or the environment.

(b) ban straw and stubble burning. The Minister of Agriculture Fisheries and Food announced on 30 November 1989 that steps would be taken in the EPB to ban straw and stubble burning by Order with effect from late 1992 in England and Wales, subject to some strictly limited exemptions.

Environment Protection Bill

This bill was introduced into the House of Lords by Lord Cranbrook, and sets out the framework for establishing an environmental protection commission and executive to integrate environmental regulation and policymaking in the UK.

NSCA BRIEFING

Resource implications

NSCA has once again emphasised the need for an improvement in resources to ensure effective enforcement; we do not consider the proposed increase of 30 in the complement of HMIP — mainly to deal with the IPC regime — adequate. With regard to Part II of the Bill (waste disposal), it is acknowledged that HMIP will need to expand its monitoring of local authorities, but that this will be accommodated "within existing staff complements". We must ask at the expense of which other duties and activities? Very little attention, too, is given to the staffing needs of local authorities to carry out their new obligations.

Financial Effects

The Government has already consulted on its plans to charge for HMIP's operation of the IPC system. NSCA has objections to some aspects of the proposals — notably the concept of relating charges directly to the activities of HMIP and the enforcement process. NSCA is committed to the Polluter Pays Principle but the present proposals fail to propose a workable system; there is no obvious way of introducing a charging system which would equitably balance the competing variables of demands on Inspectorate time, the polluting potential of a process, the size of a process, and an industry's ablity to pay.

For local authorities, the Memorandum asserts that costs of the prior approval system will be balanced by savings in "post-hoc enforcement of the Public Health Acts". Such activity is minimal for most local authorities and savings will be insignificant. Furthermore there will be considerable additional costs in authorising new processes, and training staff in new procedures. There has been no information on the proposed cost recovery system for local authorities. More details are needed on whether — or how — the system is to be self-financing, and whether this will include finance for training, enforcement and monitoring activities.

In general, there are unrealistic assumptions about the savings to be made by local authorities as they introduce the new system. This is stark comparison with the Explanatory Memorandum to the Food Safety Bill which estimates that local authorities will need an additional £30M in 1991-2 to implement its proposals.

If a "pollution tax" is to be raised to support and extend the work of HMIP and pollution control in general — and NSCA has no quibble with the overall concept — then a wider view must be taken. A formula which equates pollution emissions with overall resource use would perhaps be more apposite. Equally, a case can be made for the pollution control work of local authorities and HMIP to continue to be borne by the taxpayer/consumer, and that a pollution tax should be levied in support of more general environmental objectives. Such alternatives are already employed in some other EEC countries.

Given that the Government appears to have made up its mind on the subject NSCA would support a once-and-for-all registration fee rather than an annual charging scheme for IPC. However since the question of pollution taxes is an important matter of principle, NSCA strongly urges that it would be preferable to shelve plans for all cost recovery charging for the time being until the whole question of pollution taxes can be fully examined in the promised White Paper.

Integrated Pollution Control

Truly integrated control requires the integration of environmental policy. Part I of the Bill lays the basis for integrated control of emissions to air, water and land from industrial plant with high polluting potential (at present controls for discharges to the three media are separate). The concept of IPC is sensible — it can take an overview of a particular industrial process and determine the best practicable environmental option (BPEO) for the minimisation and dispersion of pollution. There will be benefits to industry in streamlining authorisation procedures.

Section 3(5) is of interest; whilst it is designed to implement the Large Combustion Plants Directive, it might also form the basis for other national plans — for instance, a national carbon dioxide or methane control plan. However no such plan can be truly integrated if it relates only to scheduled processes and ignores other major sources — such as motor vehicles and landfill sites — and alternatives such as energy conservation. Could the "plan" concept be expanded to include targets for pollutants from sources other than scheduled processes?

BATNEEC

One significant development is the use of the wording "best available *techniques* not entailing excessive costs" as the basis for pollution control. The full interpretation is given in clause 6 (9). This may well answer NSCA's previous criticism that "best available *technology*" could preclude the means-based control options available under the traditional BPM (best practicable means) regime. This is to be welcomed, but compliance must be assured across Europe. What steps will be taken to ensure that BAT-NEEC is uniformly defined and enforced throughout the EEC?

Works Proposed to be Scheduled for Prior Authorisation

The Bill will give effect to the 1986 Department of Environment discussion paper. It lists Schedule A & B processes, to be controlled for air pollution by HMIP and local authorities respectively. All Schedule A processes will eventually be controlled under the new IPC proposals. For the first time local authorities will get powers of prior approval and will have wider powers to prosecute. This is to be welcomed, with the proviso that adequate resources are required for proper implementation.

Access to Information

It is proposed to establish, a register system to involve HMIP (for IPC processes) and local authorities (for Schedule B air processes). The public will have access to information contained in, and required by, process authorisations. Companies may apply to have certain information excluded from the register where trade secrets or national security are considered to be at risk, with a right of appeal to the Secretary of State.

Where information has been omitted from the register with the agreement of the Inspector on the basis of trade secrecy or national security, NSCA believes that the public should have a right of appeal against such an agreement. The Government is opposed to this.

Another issue is the level of monitoring information to be provided on the register. It is essential that the pollution control agency is empowered to specify, in authorising a process, (a) the monitoring requirements necessary to validate the authorisation, and (b) the level of monitoring data to be placed on the register which it considers necessary to give a true picture of the performance of the process in order to maintain public confidence.

Straw and Stubble Burning

NSCA has welcomed the Government's announcement that an amendment is to be added to the Bill to ban straw and stubble burning. However, our evidence shows that other forms of agricultural burning also cause widespread nuisance, and would recommend an amendment to the Bill ensuring that all agricultural land is viewed as 'trade & industrial premises' for the purposes of smoke control under the 1968 *Clean Air Act*. This would give local authorities the unambiguous powers they need to control agricultural burning. The ban should extend to all crop residues.

The Next Step

As mentioned earlier, NSCA has provided — and will continue to provide — briefings to MPs and to the House of Lords. We will be closely monitoring all stages of the Bill and any amendments put down.

While we welcome the Environmental Protection Bill as an important step forward in the control of pollution, it is worth pointing out that the truly major issues are not addressed at all — pollution from transport, global warming, energy conservation and a co-ordinated approach to environmental policy making, all demand urgent attention. This reflects a lack of co-ordination at cabinet level; a common interdepartmental approach to environmental issues is required. We hope that this year's White Paper on the environment will be considerably more courageous and far-reaching.

FUTURE NSCA CONFERENCES

57th Clean Air Conference and Exhibition
BRIGHTON
15 - 18 October 1990

58th Clean Air Conference and Exhibition
EASTBOURNE
21 - 24 October 1991

59th Clean Air Conference and Exhibition
BOURNEMOUTH
19 - 22 October 1992

60th Clean Air Conference and Exhibition
BRIGHTON
4 - 7 October 1993

NSCA CAMPAIGNS

STRAW AND STUBBLE BURNING BAN

NSCA's 1989 survey of local authorities provided ample back-up if any was needed — that the Government's intention to ban straw and stubble burning after the 1992 harvest is long overdue.

Our survey and indeed telephone calls to the NSCA office over the harvest period — showed that during National Food and Farming Year, straw burning proved to be something of a public relations disaster for the agricultural industry. Earlier in the summer NSCA had warned that the hot weather of 1989 could cause a boom in air pollution from straw and stubble burning. Regrettably the warning came true with a vengeance and large areas of rural England experienced prolonged exposure to smoke, smut and smell. Complaints received by local authorities increased tenfold, as did calls to the fire brigade. The dangers of thick smoke and reduced visibility were graphically illustrated by a 40 car pile up near Abingdon, Oxfordshire, as a result of a stubble fire. Remarkably no-one was killed or seriously injured although an estimated £1 million damage to cars was caused. All this despite a plea from both the Ministry of Agricul-

Scenes like this will soon be just a memory.

ture, Fisheries and Foods and from Sir Simon Gourlay, President of the National Farmers' Union that owing to the very dry weather of last summer burning should be avoided wherever possible.

As well as causing local nuisance, stubble burning contributes to long-range air pollution. NSCA's report also showed that the burning of other waste on agricultural land is escaping control due to a loophole in the *Clean Air Acts*. Local authorities are powerless to prevent farmers from burning waste material of all types.

NSCA, therefore, welcomed Agricultural Minister, John Gummer's announcement on 30 November that straw and stubble burning would be banned by order in England and Wales with effect from late 1992. NSCA is however seeking clarification of the fact that the ban would be subject to some "strictly limited exemptions". The ban is to be legislated by an amendment to the *Environmental Protection Bill.*

In our 1989 survey, nearly 60 local authorities reported that waste burning is a frequent problem and a similar number have occasional problems. Whilst straw and stubble heads the list of offending sources, a wide variety of waste is being burnt including other crop residues, general waste, tyres and horticultural plastic. Existing powers are inadequate; the legislation is unclear and monitoring is difficult. NSCA will therefore

Some Statistics from the 1989 Survey
(1988 figures in brackets)

No. of local authorities providing information	**167**	(174)
No. of complaints received relating to:		
—smoke/smut nuisance	**1635**	(160)
—reduced visibility on roads	**223**	(35)
—effects on human health	**311**	(8)
—threat/damage to wildlife	**154**	(7)
Fire Brigade involvement		
78 (37) fire brigades dealt with		
1219 (107) separate incidents		
145 of those LAs responding use either the 1984 or 1985 byelaws to control burning.		
Infringements reported include:		
— insufficient firebreaks	**57**	(32)
— insufficient fire supervision	**42**	(26)
— burning in high winds	**34**	(23)
— burning after sunset/at weekends	**26**	(10)
Enforcements problems include:		
— insufficient staff for surveillance	**88**	(57)
— gaining evidence for prosecution	**32**	(13)
— locating burn of gaining access	**55**	(27)

be lobbying for a ban on the burning of all crop residues and wastes. We also want all agricultural land to be viewed as "trade and industrial premises" for the purposes of smoke control under the Clean Air Act 1968.

The *Environmental Protection Bill* will also empower Ministers to make regulations setting out conditions under which burning can take place prior to the ban.

DIESEL EMISSIONS

Last year's NSCA report *Dirty Diesels* showed just how serious the problem of diesel smoke emissions is. Since the report was published there has been more evidence from the US National Institute for Occupational Safety and Health (NIOSH) about the potentially carcinogenic nature of diesel fumes. Following the recent EEC agreements on car emissions, the relative importance of heavy-duty diesel emissions will increase. A recent report from Warren Spring Laboratory states: "Heavy duty diesel emissions will become the predominant source of highway NOx and THC (hydrocarbon) emissions once all future car emissions regulations are in place and this is rapidly becoming a key issue in determining future UK Government policy for emission controls on these vehicles".

NSCA is particularly concerned about the lack of control over diesel vehicle smoke emissions. Diesel is now the major contributor to urban smoke and is a recognised health hazard. Smoking lorries, buses and taxis are very unpopular with the public. There is a loophole in existing legislation which allows smoking vehicles to escape control unless they create so much smoke as to be a hazard to road users. The police will not control smoking diesels, and environmental health officers have no powers to do so. Discussions are now taking place about the possibility of an amendment to the Environmental Protection ("Green") Bill to control smoking vehicles on the road.

A second issue is improving emission standards for new vehicles. The European Commission will shortly issue proposals — expected to be agreed by the ad-hoc motor vehicle emissions working group — to tighten emission standards for big diesels. We understand that the major European diesel engine manufacturers have formed a co-operative consortium in order to develop new engines which will meet tough new emission standards.

NSCA believes that the UK government should be pressing for the tightest possible standards for both gaseous and particulate emissions, equivalent to those proposed in the USA for introduction in 1994 (US 1994 standards). Last year in a letter to NSCA, the Department of Transport took the view that such standards could not be achieved because the technology is not proven. Now, however, US manufacturers assert that they will be able to meet the stringent requirements by 1994. We assume therefore, that the R&D which is already being undertaken by manufacturers in order to meet US1994 standards will enable European manufacturers to meet similar standards by 1995.

NSCA NEWS AND VIEWS

NSCA COMMENT

IMPLEMENTATION OF THE LARGE COMBUSTION PLANTS DIRECTIVE

Introduction

On 24 November 1988 the European Community formally adopted the Directive on the limitation of emissions of certain pollutants into the air from large combustion plants (LCP Directive; (88/609/EEC)). The Government welcomed this agreement which it felt was of major importance for the environmental gains it would produce in many areas sensitive to acid deposition. The Directive sets stringent emission standards which must be applied to every new (post 1.7. 1987) large plant and sets programmes for reducing total emissions of pollutants from existing large plants.

All the plants to which the Directive applies are in the private sector, are under the control of the national pollution inspectorates and, under proposed new legislation, will be scheduled for integrated pollution control. Existing (pre-1987) plants are distributed between the electricity supply industry (about 86% of LCP sulphur dioxide (SO_2) emissions, 84% of LCP oxides of nitrogen (NOx)), 11 oil refineries (5% of SO_2, 5% of NOx) and a number of other industrial sources (9% of SO_2, 11% of NOx). The percentages relate to the latest available year; the relative importance of the electricity industry has been increasing over time.

NSCA welcomed the publication of the consultation paper as a first step towards implementing the LCP Directive but warned that the Government's proposals may not be enough to meet the terms of the Directive. NSCA said that a number of matters remained to be clarified especially relating to a fair distribution of the emission reduction burden between competing industries. It was also critical of the Government for failing to promote an adequate programme of flue gas desulphurisation for Britain's power stations. NSCA's detailed comments follow.

BATNEEC or BPM?

The interchangeable use of BPM with BATNEEC deserves some comment. It would be wrong to assume that the two concepts are effectively the same; a requirement to reduce emissions using *technology*-based solutions could be interpreted as precluding such *means*-based alternatives as, for instance, the use of low-sulphur fuels. In this sense the requirement to meet BPM is both more flexible and more stringent than a strict interpretation of BATNEEC. We urge that the DOE should formally outline the basis on which it expects BATNEEC to be enforced, and that this should specifically embody the BPM approach.

It is also proposed that where BATNEEC is in conflict with the National Plan the more stringent criteria will be overriding. Whilst this is clearly in the interests of pollution control, there is a potentially grey area in which individual plant operators might feel that they are being penalised with excessive costs in comparison with those who are more easily able to meet the stringent criteria. The resolution of this issue will depend on the provisions of the National Plan, and upon the interpretation of the new criterion "Not Entailing Excessive Costs".

In the case of a breach of authorisation, the expertise of HMIP will be crucial in determining what remedies will be practicable. Where major industrial plant is concerned, there must be an element of flexibility built in to authorisations to allow for breakdowns and for planned outages of pollution control systems, with the requirement that these should be kept to an absolute minimum.

Integrated Pollution Control

It is uncertain whether the "normal IPC machinery" will result in the required reductions as this machinery is not yet in place and has not yet been tried and tested. The timing is also uncertain; NSCA queries whether HMIP, given its current levels of staff and resources, will be able to undertake the task in time, except at the expense of other important regulatory work. Such operational problems could give rise to regional variations in control standards and potential competitive advantages to plants in different parts of the country.

Emission Reductions

The projections for emission reductions have been disaggregated into three sectors; the ESI, refineries and other industry. NSCA considers that for each sector the current projections may prove to be over-optimistic.

The case is made for a disproportionately small portion of early emission reductions to be borne by the Electricity Supply Industry. Other sectors of industry have argued they will be penalised as a result, noting that the ESI is responsible for 86% of LCP emissions of SO_2 and that industries and refineries have already reduced their emissions by 49% and 43% respectively from the 1980 base. Sulphur reduction costs are proportionally lower on the largest emitters, and the ESI could also achieve emission reductions by fuel switching. It is only fair to register our disappointment at the slow pace of progress on FGD; the Government has had considerable notice of the need to reduce emissions and has failed to act effectively.

For the refinery sector, NSCA understands that the recent emission reductions have been achieved as a result of falling capacity combined with peak availablity of low-sulphur crude. Since no further reduction in refinery capacity is planned, and increasing use of high-sulphur crude seems inevitable, emission reduction will involve additional costs to this sector. There will also be a "knock on" effect on industrial emissions as sulphur levels in fuel oils rise.

For the industrial sector, it is widely acknowledged that the data on which industrial emissions are based are very uncertain. Until HMIP completes its LCP inventory it will be impossible to say whether the targets are realistic or achievable.

For all three sectors, then, NSCA feels there is considerable uncertainty about whether the targets can be achieved, and considerable argument about the costs implications. What is more, there is no quantification of the possible range of error embodied in the forecasts and targets. The three sectors will have differing views about the fairness of the proposals, but will be arguing against a background of incomplete information.

HMIP Resources

Once more we must draw attention to the need for adequate resources and staff for HMIP, to enable adequate monitoring and enforcement of the authorisations which will be the instruments of implementation. The European Commission will want to be, certain that compliance is properly policed. All of NSCA's industrial members who commented on the paper independently expressed the concern that HMIP may be unable to meet the expanded workload which the proposals entail.

NATIONAL AUDIT OFFICE STUDY ON HM INSPECTORATE OF POLLUTION

The long-running and much publicised problems at HM Inspectorate of Pollution have also been the subject of considerable comment both within the media, in Parliament and elsewhere. Throughout 1989, NSCA and others had expressed grave concern that HMIP was severely under-staffed, and that arrangements for its reorganisation and restructuring had undermined the morale of staff, and that recruiting drives had failed to attract suitably qualified applicants. Unless urgent steps were taken, we said, HMIP would not be in a position to implement the arrangements for integrated pollution control and the new legislation in the *Environmental Protection Bill* would be unworkable. The publication late in 1989 of an internal Department of Environment document ("Minis 10") confirmed our fears by showing a continuing fall in standards within HMIP — failure to reach targets, shortages of manpower and organisational problems.

NSCA, therefore welcomed the announcement that the National Audit Office (NAO) was to undertake a study on the control and monitoring of pollution, focussing on the work of HMIP. NSCA was invited to contribute to the study. In our submission, we focussed on the scope for integration of pollution control, the recent restructuring of HMIP and HMIP's role in environmental policy making. Once again we stressed the need for proper attention to be given to the staffing and resourcing of HMIP in order to reverse the worrying slide in internal morale and external confidence in the Inspectorate.

Integration of Pollution Control

Whilst the concept is sound, the scope for integration of pollution by HMIP is limited. In our view there will be a continued need for specialisation of control for air, water, waste and radioactive substances. There are only a few cases where there is clear transferability of pollutants between air, land and water. And indeed the National Rivers Authority, in protecting water courses, appear to have no duty to consider the effect of their decisions on other media. Additionally, when considering the potential role of the Water Inspectors in controlling Red List substances, apart from the NRA involvement, there are a substantial number of potential registrations which have no air pollution potential (such as cadmium plating works). Similar considerations apply to radioactive substances' works where about 15% of the works having RAS authorisations are registered for air pollution, but of the works having *Radioactive Substances Act* registrations only 1.5% are registered for air pollution control.

HMIP Structure

It is apparent that the new structure of HMIP appears to have been decided at the outset without undertaking fundamental reassessment of the needs of pollution control. We are not convinced that the new structure could achieve HMIP's aim to exercise efficiently and effectively statutory powers for controlling radioactive substances, emissions to air from scheduled processes and industrial discharges to water containing Red List substances. Bringing together the various Inspectorates despite their varying roles and creating an all-purpose Inspector is likely to be at the expense of the expertise of the various branches and makes no provision for specialism. In our view there remains a need for specialism with a clearly identified head of profession (air, water, waste, radioactive) to take decisions on policy. We believe that the structure of HMIP requires strong central coordination to ensure that pollution control policy is applied effectively and consistently. At the grass roots, however, the system of well-staffed District Offices with a range of specialists maintaining direct contact with local industry and local authorities must be reinforced rather than undermined.

HMIP Role

HMIP's role must be wider than at present. It should be involved in the initiation and development of UK legislation, in the negotiation of EEC Directives in Brussels and in policy formulation on environmental control matters. In this it should provide the technical expertise lacking within the areas of the Department of Environment currently charged with policy determination — particularly on matters of integration and coordination. This role should be formally recognised and HMIP provided with the appropriate resources and status to carry it out.

ACCESS TO INFORMATION

In a consultation paper published in August 1989, the Government set out its proposals for establishing and maintaining registers to allow public access to information held by HM Inspectorate of Pollution in connection with the new system of Integrated Pollution Control (IPC). The consultation also related to information held by local authorities in connection with the new system of air pollution control. The consultation paper details proposals for the scope and content of the registers, as well as measures to safeguard confidential and sensitive information.

NSCA supported the concept of a register-based system for access to information, as proposed in the paper, and the proposed mechanism which will empower local pollution control authorities to omit information from the register on grounds of commercial sensitivity, with a right of appeal to the Secretary of State. However in practice, NSCA would expect there to be few occasions when this would be thought necessary. Furthermore the converse situation — where a pollution control authority agrees to omit specified information — requires a balancing right for the public to appeal to the Secretary of State, should it appear that information is being withheld without reasonable cause. NSCA suggests that such appeals should be made through a recognised body (such as a local authority or environmental group) or through an elected representative (such as an MP).

On the question of the quality and extent of the monitoring data available, NSCA said that the public should have access to any data which is required by the official authorisation for the process itself. When setting the terms of the authorisation, therefore, the local pollution authority should specify the type and quantity of monitoring required bearing in mind the level of data which will be necessary to establish public confidence.

NSCA expressed concern that no effort had been made to quantify the extra costs which the proposals would incur for pollution control authorities. Such cost assessments are undertaken routinely by industry, and should be possible in this case. Perhaps such an exercise would make too strong a case for additional resourcing.

NSCA also pointed out that as the proposals only addressed a limited aspect of pollution control, there was a danger that access to environmental information would not be uniform across the environmental spectrum. Given the current move toward integration, the provisions of the proposed legislation should clearly extend to all aspects of environmental control including radioactive discharges, waste disposal, and the storage of hazardous materials. We would expect more far-reaching proposals to be published.

ENVIRONMENTAL LABELLING

The apparent willingness of consumers to buy products whose effect on the environment may be more benign has, if anything resulted in consumers becoming totally confused — if not misled — by the plethora of labels and claims for "green" products. NSCA therefore welcomed the Government's proposals to introduce a system of positive environmental labelling.

We pointed out that as no manufactured product can ever be 100% "environmentally friendly", a main objective of any environmental labelling scheme should be to provide the consumer with the best advice on which products within a specific category are "environmentally friendlier". A single uniform labelling scheme covering all EC Member States would be preferable. However, agreement on such a scheme should not be a reason for delaying action in the UK to deal with the unsatisfactory situation promoted by the current "free-for-all" with regard to so-called environmental labels.

Because of the need for any labelling scheme to be a part of an overall strategy for environmental protection, and for it to have real credibility in the eyes of consumers, the Society in common with many other organisations was not in favour of assessment based only on impact during use and disposal. It felt this could give a misleading impression of the product's environmental impact. Given too, that other EC Member States favour a more comprehensive assessment of environmental impact, it would therefore make sense for the UK to adopt the same approach from the outset.

Assessment should clearly rest on a firm scientific basis and to be effective must take into account the environmental impact at all stages of production process, use and disposal. If it does not, any beneficial effects for the environment in use and disposal of a particular product or service could be entirely cancelled out by, e.g. very high energy consumption during initial manufacture. A lifecycle — i.e. raw material through to disposal — assessment is essential and is entirely compatible with the best practicable environmental option (BPEO) approach that the Royal Commission on Environmental Pollution (RCEP) has put forward and which the Government favours. Also compliance with pollution control legislation should not be taken as sole evidence of an environmentally sound production process.

In the light of the widespread opposition to an assessment based solely on environmental impact during use and disposal, the government is reconsidering its proposal; it is now expected to propose an assessment based on the lifecycle of the product ("cradle-to-grave"). The European Commission's plans for a Euro-wide scheme are also expected shortly.

The Government is setting up an advisory group to develop plans for a voluntary eco-labelling scheme on a European Community-wide basis. Plans to amend the *Trade Descriptions Act* to outlaw misleading claims for green products are also under discussion.

ANNUAL GENERAL MEETING

The explosion of interest in environmental issues and the Society's 90th anniversary had both conspired to make his year as Chairman a memorable one, said Bill Snow speaking at the Society's AGM in October. Introducing the Society's Annual Report 1988/89 he said that the wide range of subjects on which the Society was now consulted — from the role and functions of waste disposal authorities to environmental labelling — was a reflection of the high regard in which the Society was held. And he said that while the Government's new-found enthusiasm for protection of the environment was to be welcomed, little practical improvement could be made unless the right structure for implementing controls and developing policy was in place. Bill Snow hoped that the Government would take heed of the calls from different sectors, including the Society for a critical restructuring of the way in which Government responsibilities for environmental protection policy was handled. The continuing problems of inadequate staffing and resourcing of HM Inspectorate of Pollution was also a matter of grave concern to the Society.

New Name for Society

The introduction of an integrated approach to pollution control requiring solutions to pollution problems which take account of their effects on all aspects of the environment, has led to a widening of Society's own workload. For some years, noise pollution has been a central part of our agenda, and more recently the Society has looked at waste management, energy policy, acid rain and civil nuclear power. The Society has now decided to recognise its expanding interest with a change of name.

A formal resolution was put to the AGM and it was unanimously agreed that the Society's name should now be "The National Society for Clean Air and Environmental Protection". The Society will however continue to be known in its shortened form of NSCA, which will also remain as the Society's logo.

New President

Sir John Mason, CB, DSc, FRS, was unanimously elected to serve as President, in succession to Lord Nathan. In

NSCA Officers 1989-90: (l to r) Brian Edwick, Bill Snow, Lord Nathan, Dr. Frank Shephard, Alan Rees, Jane Inglefield, Sir John Mason.

remarking on the unprecedented interest and concern in environmental matters, both politically and by the general public, Sir John said the NSCA had a particularly important role to play given its reputation for putting forward sound and balanced views. He was concerned that many members of the general public were becoming genuinely confused about such issues as ozone depletion and the greenhouse effect: there was a great need for clear information on the very complex issues facing mankind.

Hon. Members

The Society elected three Honorary Members, all of whom have been associated with the Society for many years. They were presented with commemorative certificates.

Bob Lander was Chief Environmental Health Officer to Middlesbrough Borough Council until his recent retirement, and also represented the Institution of Environmental Health Officers on the Council, as well as chairing NSCA's Parliamentary and Local Government Committee.

Bill Wheatley was a member of the Council from 1966-89 and represented British Coal. He was also Chairman of the Council for the year 1986-87.

Charles Robson, who was unable to be present, recently retired as Environmental Health Officer for Darlington Borough Council and as Hon. Secretary of the Northern Division of NSCA.

Chairman 1989/90

Dr. Frank Shephard who represents British Gas and the Institution of Gas Engineers was elected Chairman of the Council at the meeting of the Council held in Scarborough on 23 October. Cllr. Mrs. Jane Inglefield (East Midlands Division) was elected Deputy Chairman of the Society. Alan Rees (Central Southern Division) becomes Senior Deputy Chairman.

CENTRAL DIVISION

At a recent meeting, South Oxfordshire District Council formally congratulated Cllr. J.C. Blewitt JP for his many years of campaigning on clean air issues. Cllr. Blewitt was for many years one of S. Oxfordshire's representatives to NSCA, and has been particularly active in calling for straw and stubble burning to be banned.

NORTHERN DIVISION

Forty-one members attended the Autumn meeting of the Northern Division held on 1 December. During a full agenda which discussed NSCA's current work, Cllr. Len Poole presented Charles Robson with his certificate commemorating his Hon. Membership of the NSCA which had been announced at the Society's AGM in October.

The meeting was hosted by Newcastle City Council and following the formal agenda, members heard a presentation of the concept and development of the refuse burning plant at Byker, which now recycles refuse from half of Newcastle's population. Refuse is converted into a fuel pellet with a calorific value of 8,000 BTU, moisture content 6-7%; 1,000 tons of domestic waste converts to about 250 tons of pellets; when burnt, these give lower sulphur emissions but higher chlorine emissions. Future developments at the RDF plant include removal of cullet and compost.

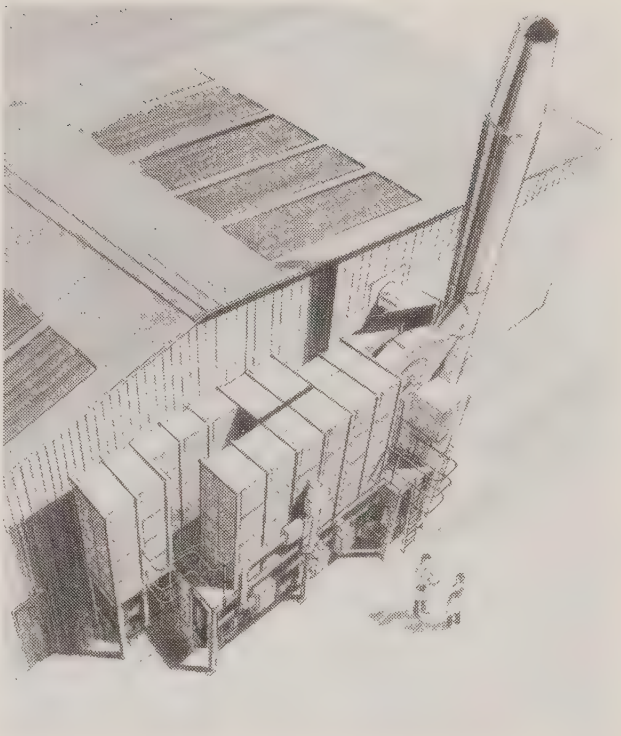
Newcastle City Council is also supporting proposals by Tyneside Community Heating Project for a CHP power station. If the proposal, estimated at £100 million, goes ahead, it could provide almost two-thirds of central Tyneside's electricity needs. The CHP power station would burn natural gas to provide 150 mw of electricity, and would harness about 50 mw of waste energy in the form of hot water which could be piped directly to consumers.

INCINERATION

Byrom Lees, chair of NSCA's recently formed working group on waste disposal, attended a seminar on incineration held at the Institution of Mechanical Engineers in December. The main focus of the seminar was whether incineration is an acceptable means of waste disposal.

Various papers looked at the practice in Europe and elsewhere where incineration of municipal waste is often the preferred option: Switzerland incinerates 80% of its domestic waste, The Netherlands 40%, Sweden 50% and Japan 68%. At the moment, only a very small proportion of municipal waste is incinerated in the UK, so the contribution to the greenhouse effect of methane emissions from landfill sites was therefore considered of relevance. In discussion Byrom Lees suggested that the effect of emissions of methane from landfill sites could be of the same order in relation to the greenhouse effect as the carbon dioxide from the whole of the coal burnt in the CEGB Power Stations.

Other points arising from the seminar were that incineration of domestic waste is an environmentally acceptable means of waste disposal; incineration



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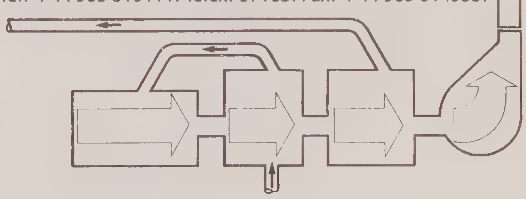


Reader Enquiry Service No. 8927

instead of disposal in landfill sites, will bring about a major reduction in Britain's contribution to the greenhouse effect and save valuable fuel reserves; the generated steam from the incinerator boilers can be used in heat and power schemes which will operate with at least 50% efficiency when they are installed at suitable sites; however, the capital cost of the plant will probably require government or regional subsidies in Britain, as applied in other European Countries, because incineration of domestic waste incorporating heat and power schemes is a long term investment.

Byrom Lees' more detailed report of the seminar is available to Members on request to NSCA in Brighton.

INFORMATION REQUESTS DOUBLE

Final totals for 1989 show that NSCA received almost 5,000 written requests for information — the total for 1988 was 2,400. Of these nearly 3,500 were from children under 18, of which a significant number were wanting material in connection with GCSE projects. The remainder of the information requests came mainly from teachers, undergraduates, as well as from members of the general public. In addition around 50 telephone enquiries are handled each week, excluding calls from the media.

NSCA GOES DUTCH

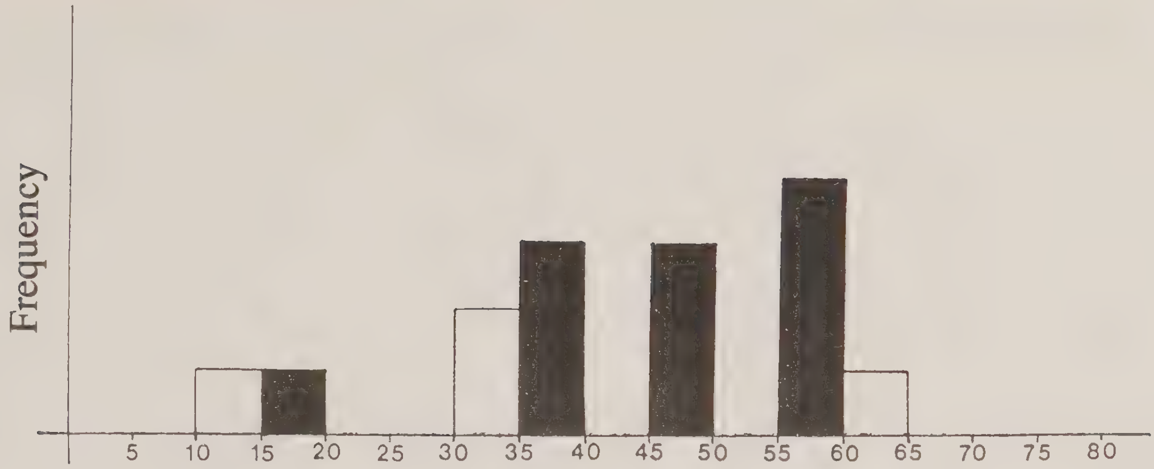
The Dutch Clean Air Society (CLAN) has received a gift of Dfl 25,000 (about £7,800) from an accounting firm celebrating its 25th anniversary. CLAN has decided to use the money for an educational project based on NSCA's Air Pollution Teaching Pack, which will be translated into Dutch.

NOx SURVEY IN LEICESTER & LEICESTERSHIRE

The NSCA has supported a NOx diffusion tube survey as part of a cation/anion deposition and pH study in Leicester and Leicestershire through its research grant scheme. The work was undertaken by three final year students as their projects for the BSc Science and Environment degree at Leicester Polytechnic under the supervision of Dr. Malcolm Fox, Chemistry Department. The NOx diffusion tubes were supplied and analysed by Gradko International Ltd, Winchester.

The tubes were exposed over two periods, for the week beginning 9 December 1988 and for the week beginning 4 February 1989. The first week's weather was unusually mild, the second week was considerably colder. Twenty-five sites were used for each period of exposure, each classified according to the National Survey of Air Pollution scheme. Twenty-eight per cent of sites were in rural villages, 64% in areas of inner and outer suburban housing and 8% in inner area mixed industrial/housing areas. Rural areas gave a NOx value of 40 $\mu g\ m^{-3}$, the inner and outer suburban housing gave a value of 43 $\mu g\ m^{-3}$. Duplicate tube exposures showed a variation of 8%.

The highest value was found during the second week's exposure for an inner area mixed industrial/housing area which also had heavy traffic close by, at 70 $\mu g\ m^{-3}$. The value at a very rural site, Rutland Water Reservoir, averaged 36.5 $\mu g\ m^{-3}$ over the two separate weeks. The two lowest values were found first, in the midst of a modern housing estate in a village five miles west from Leicester (almost all houses with gas central heat-



NO$_2$ μg m^{-3}
frequency distribution of NO$_2$ (in ranges)

ing) at 12 μg m^{-3}. This site was on the rising ground towards Charnwood Forest and was relatively exposed. The second site was in a rural village due south of Leicester at 19 μg m^{-3}. A frequency distribution, in 5 μg m^{-3} ranges, for all of the sites for the first week is given below.

Twenty-five per cent NOx values were in excess of the 50 μg m^{-3} EEC Directive guide values but all except one of these were within 10 μg m^{-3} of the guide value, ie., less than 60 μg m^{-3}. The average over the two week's set of data, for rural and urban sites together, is 42 μg m^{-3}. No values at any site approached the EEC limit value of 200 μg m^{-3}.

QUIETER CLAY SHOOTS

Results of initial tests to determine the effectiveness of a silenced shotgun could go some way to solving the nuisance and annoyance caused to people living near clay pigeon shoots. The test was carried out by Derbyshire Pollution Advisory Council and the East Midlands Division of the NSCA.

The Hushpower shotgun silencer, which is manufactured by Gunsport of Rotherham, has been developed primarily to enable clay pigeon shooting to take place on sites which would otherwise be precluded on the grounds of noise.

The gun used in the test was a single barrel 12 bore weapon which had been modified to accept the silencer. A similar unsilenced weapon was used for comparison. The manufacturers claim that the best results are obtained with subsonic cartridges and so the contribution of these was also investigated. It was originally intended to carry out a fairly comprehensive series of noise measurements at a number of positions around the gun and at different distances from the shooter. However, on the day of the test weather conditions were very poor with wind and driving rain and consequently only a limited number of measurements could be made.

Four different gun/cartridge combinations were investigated:

- Unsilenced gun and standard cartridges
- Silenced gun and subsonic cartridges
- Silenced gun and standard cartridges

- Unsilenced gun and subsonic cartridges

Measurements were made at a point 5 metres upwind of the shooter at right angles to the line of fire. A number of shots were fired for each gun/cartridge combination and the results, measured in dB(A) (Peak Hold) are shown in the box.

These results show that the silenced gun with subsonic cartridges is, on average 18 dB(A) quieter than the unsilenced gun firing standard cartridges. Also when using standard cartridges the silenced gun is on average 13 dB(A) quieter than the unsilenced gun. The reductions in noise levels are sufficient to resolve the noise problems which affect many established clay pigeon shoots, and it appears that the silenced weapon performs, so far as the shooter is concerned, in a manner similar to a standard gun.

The organisers of these tests wish to acknowledge their thanks to Gunsport for making their silenced gun available for test, to Lucas CEL for providing instrumentation and to Mr. John Price of Swarkestone, Derbyshire for allowing them to carry out the tests at his farm.

Sound Level dB(A) (Peak Hold)

Gun/Cartridge Combination	Individual Shots	Average
Unsilenced Gun/Standard Cartridges	145.5, 144.8, 145.5	145.3
Silenced Gun/Subsonic Cartridges	127.5, 127.5, 127.3	127.4
Silenced Gun/Standard Cartridges	131.0, 134.0, 131.5	132.2
Unsilenced Gun/Subsonic Cartridges	143.5, 144.5, 143.5, 142	143.4

UPDATE

NOISE AT WORK REGULATIONS 1989

These Regulations which came into force on 1 January 1990 require employers to take specific steps to prevent damage to the hearing of workers from excessive noise. The regulations apply to all workers — who must cooperate with their employer's programme to prevent hearing damage — in Great Britain covered by the *Health and Safety at Work Act 1974* and implement a 1986 European Community Directive.

The Health and Safety Executive has now prepared detailed guidance notes of the main steps required under the Regulations and how the HSW Act general duties may apply to noise. *Noise Guide No. 1* is concerned with the legal duties of employers to prevent damage to hearing; and *Noise Guide No. 2* deals similarly with the legal duties of designers, manufacturers, importers and suppliers.

NOISE CONTROL REVIEW

Complaints about noise have been rising steadily since 1976. Department of Environment statistics for 1986/87 — the latest year available — show that there were nearly 47,000 complaints about noise from domestic premises. During 1989 there was also increasing concern about noise from "acid house" parties. However, often local authorities have some difficulty in dealing with noise nuisance, in part because of the time at which such nuisance occurs, but also because of ambiguities in the relevant sections of the *Control of Pollution Act 1974.* Secretary of State for the Environment, Chris Patten, announced in December that his Department is now reviewing noise pollution law with a view to strengthening it and providing clearer guidance to local authorities on their powers. A working party involving government departments and other interested organisations will shortly be set up to carry out the review.

MOTOR CYCLE NOISE

Regulations implementing a 1987 EEC Directive setting limits on motorcycle noise have been laid before Parliament. The *Road Vehicle (Construction and Use) (Amendment) (No.3) Regulations 1989* come into effect on 1 April 1991. The new limits will be

● 80 cc	77 dB(A)
● 80 — 175 cc	79 dB(A)
● over 175 cc	82 dB(A)

DRINKING WATER INSPECTORATE

A new Government Inspectorate to ensure compliance with drinking water standards came into being in January 1990. The Inspectorate has power to check on water undertakers' arrangements for sampling, or to take samples themselves. Annual reports on individual water undertakers will be prepared and advice given on private water supplies.

AICB

16th WORLD CONGRESS
INTERNATIONAL ASSOCIATION AGAINST NOISE, AICB

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Friday 8 June
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For full details of the programme and registration form contact the Organising Secretariat

NATIONAL SOCIETY FOR CLEAN AIR
AND ENVIRONMENTAL PROTECTION
136 North Street - Brighton BN1 1RG
Telephone: 0273 26313 Fax: 0273 735802

HMIP DIRECTOR

The Secretary of State for the Environment has appointed Dr. F.S. Feates, the present Deputy Director and Chief Inspector, Her Majesty's Inspectorate of Pollution (HMIP) to become the new Director. Dr. Feates will remain Chief Inspector.

Dr. Feates was appointed Chief Radio-chemical Inspector in 1984 and in February 1989, Deputy Director HMIP. Dr. Feates is a BSc (Special Chemistry) first class honours 1954; PhD (Physical Chemistry) 1956; and became a Fellow of the Royal Institute of Chemistry in 1970. He is also a Fellow of the Royal Society of Chemistry and a Chartered Chemist.

STUDY OF ENVIRONMENTAL HEALTH

The Audit Commission is to look at the management of local authority environmental health departments in England and Wales; the study will also look at the impact of statutory provisions and guidance from central government on their economy, efficiency and effectiveness.

Following concern from NSCA that the draft terms of reference focussed only on housing and food safety, we understand that the Audit Commission is considering the inclusion of the control of pollution as part of its remit. In support of our request, we argued that pollution control is an area of considerable public interest in which EHOs are developing an increasing profile; that it is clear that some departments are failing to control pollution because of resource problems; and because forthcoming legislation will increase the responsibility of environmental health departments for pollution control.

NSCA is concerned that environmental health departments face considerable difficulties in fulfilling their obligation to their communities because of shortages of staff and resources and the pressure of an ever increasing range of tasks as public awareness grows.

SMOKE CONTROL

Grants totalling £2.3 million for smoke control work are to be paid to various councils in the North East, North West and Yorkshire and Humberside regions. The grants cover work for a four year period and are payable under section 13 of the *Clean Air Act 1956.*

AIR QUALITY INFORMATION

Junior Environment Minister, David Heathcoat-Amory, has announced that information will be released daily when World Health Organisation guidelines for carbon monoxide, nitrogen dioxide or sulphur dioxide are exceeded; the WHO guidelines are CO, 25 ppm hourly averages; NO_2, 210 ppb; and SO_2, 122 ppb. This follows an earlier announcement late last summer that data on ozone levels collected by the Warren Spring Laboratory would be made available on a similar basis (see *Clean Air*, Autumn 1989).

PAPER FROM STRAW

Plans to build a paper mill on Humberside could go a long way in dealing with farmers' unwanted straw once the ban on straw and stubble burning takes effect in 1992.

Eurocell, a subsidiary of Berisford Bristar has applied for local planning approval and government financial support to build a mill capable of processing up to 750,000 tonnes of straw annually into high quality bleached paper pulp.

DUBLIN SMOG

Despite the introduction of smokeless zones in some parts of Dublin, very cold weather coupled with no wind resulted in smog readings of 916 $\mu g\ m^{-3}$ of air in December. This is nearly four times the EEC safety level of 250 $\mu g\ m^{-3}$, and the European Commission has now begun proceedings to force Ireland to take more steps to bring the level down. In an effort to improve the situation the Irish Government has legalised the use of peat briquettes in smoke control areas (in Britain, these are not classed as smokeless); £3 million in grants will also be paid for heating system conversion and a TV advertising campaign promoting cleaner fuels.

LEAD IN AIR

Lead concentrations in the atmosphere fell 53% in 1988 compared to 1985, a figure that should continue to fall as use of lead-free petrol goes on rising; as at November 1989, sales of unleaded petrol accounted for nearly 30% of sales — in November 1988, sales of unleaded petrol accounted for just over 2% of sales.

BENZENE EMISSIONS

The US Environmental Protection Agency has finalised rules to reduce industrial benzene emissions. In the US, benzene is classified as a known human carcinogen and has been linked to adult leukaemia; exposure to emissions of benzene from industrial sources represents an important long-term health concern, particularly for those who live close to major emitters.

Benzene is used to manufacture a wide variety of products including plastics, insecticides and polyurethane foam. Benzene emissions are also present in vehicle exhaust, at the petrol pump, in cigarette smoke and in many consumer products. It is derived from petroleum.

The new rules will result in a reduction of 20,000 tons, and the EPA is also proposing further requirements for major benzene sources which would result in an additional reduction of 14,300 tons per year.

In setting emission standards under the hazardous air pollutants section of the US *Clean Air Act*, the EPA aims to provide maximum feasible protection against risks to health by protecting the greatest number of people possible to an individual lifetime risk of developing cancer no higher than approximately one in a million, and one in 10,000 the estimated risk that a person living near a plant would have if exposed to the maximum pollutant concentrations for 70 years. The new regulations would result in over 99 per cent of the exposed population facing a maximum individual risk of less than one in a million.

(Source: JAPCA, November 1989)

INTERNATIONAL LAW CENTRE

Two British barristers and two American attorneys have founded the Centre for International Environmental Law (CIEL). Based at King's College, London, CIEL has been established to contribute to the promotion of international law as a means of protecting the global environment through teaching, research and legal advice. CIEL will provide assistance to individuals, NGOs and states, especially the economically disadvantaged.

Projects recently carried out include one on behalf of an NGO and several developing countries to investigate the use of principles of international law to develop just and equitable solutions to the consequences of global warming, including measures to restore and protect the human and natural environment. CIEL has advised Greenpeace on the application of European Community law to the regime established by the Antarctic Minerals Convention, and drafted amendments to the Antarctic Minerals Bill; CIEL is also working in cooperation with the World Wide Fund for Nature to design a more effective enforcement system to protect the endangered African elephant.

CIEL is currently funded by donations and will, where appropriate, charge for its services on a ‘pro bono’ basis.

EURO AGENCY

At their November meeting European Community Environment Ministers endorsed plans for a European environment agency, which would also be open to participation from non EC countries from the Eastern bloc; this would give those countries, many of whom are experiencing appalling levels of air pollution, access to Western Europe’s experience and technology for tackling pollution.

Initially, the agency’s remit will be limited to collecting and disseminating environmental data. EC Environment Minister Carlo Ripa di Meana hopes that eventually the agency will have a role similar to that of the US Environmental Protection Agency.

A decision on the location of the European agency has yet to be finalised. UK Environment Secretary, Chris Patten, has proposed Cambridge.

BUSINESS AND ENVIRONMENT PROGRAMME

More than 300 supporters from a wide range of businesses have joined The Environment Council’s Business and Environment Programme. Launched last November, the programme aims to help managers realise the opportunities generated by growing environmental pressures on business and to appreciate the risks of ignoring them. It aims to promote the concept that “environmental sense is commercial sense”.

Supporters are kept in touch through *Trends* — an executive summary of a specific environmental issue and its commercial implications; issues covered have included lead-free petrol, recycled paper and environmentally friendly offices. Regular seminars and briefing sessions are also organised; insomniacs, early starters and very busy people will be pleased to know that a number of programme events start at 7.30 a.m. (finishing at 9.30)!

For more details of the Business and Environment Programme, write to The Environment Council at 80 York Way, London N1 9AG.

LETTER TO THE EDITOR

THE LARGE COMBUSTION PLANT DIRECTIVE: HOW EFFECTIVE WILL IT BE?

I would like to congratulate Dr. P. F. Chester, Corporate Technical Director, National Power on his excellent paper relating to the effectiveness of the Large Combustion Plant Directive, published in the Autumn Issue of *Clean Air.*

He had emphasised previously the importance of making the correct diagnosis before going to the second stage of applying a remedy (1). There is, however, a third stage which is also vitally important, that of confirming that the remedy is effective. It is clear from this report that he is pressing the need for this third stage without being specific.

When measures were taken to overcome the smog problem following the deadly 1952 smog in London which resulted in the death of at least 4,000 people, three major remedies were introduced:

a) The 1956 *Clean Air Act* with the introduction of “smokeless zones” in towns and cities.

b) The introduction of natural gas to homes.

c) The replacement of old hand-fired coal-burning boilers in industry and railway locomotives.

Measurements and estimations by Warren Spring Laboratory (2), including the National Survey of Smoke and Sulphur Dioxide, have shown that the sulphur dioxide concentration in many of our cities has been reduced to 50-60 mg/m^3, one-sixth of the level before 1960 and that the emission of smoke from coal combustion in the UK is now less than 0.3 million tonnes pa, one-tenth of the level before 1960.

The number of deaths related to these pollutants have fallen dramatically and most of the old chest hospitals have closed. We can now recover and clean many of our buildings to their pristine splendour, an example seen by many visitors to this Country being the House of Commons. Other associated problems, such as disruption of traffic and loss of business, have also been removed. Smogs occurred for many centuries in Britain. They have now been eliminated.

Considering desulphurisation, it would appear from his paper that Chester considers that it was not fully proven that the correct diagnosis was made before the decision was taken to introduce desulphurisation at Drax. However, the second stage is going ahead and sulphur dioxide emissions from Drax will be reduced by 90% when the desulphurisation system is fully installed.

The tall stack policy ensures that under present operating conditions local pollution due to sulphur dioxide is not a problem near to Drax Power Station but the main dry precipitation of sulphur dioxide together with some wet precipitation will begin some 5-10 km radius from the Station. Measurement of the effect of desulphurisation, that is the third stage, should be carried out to the east and north east of the Station, mainly in the County of Humberside, particularly in the zone where the scientists estimate maximum precipitation occurs.

In view of the high fuel consumption at Drax at the present time, measurements should show that sulphur dioxide concentrations at ground level have been considerably reduced in these areas when desulphurisation is introduced. Far more important, however, will be the effect on sulphur dioxide sensitive crops, forests, rivers and possibly health of animals and humans. To assess these effects, measurements and surveys together with appropriate bodies, such as the Forestry Commission and NHS, should be carried out now, before the desulphurisation equipment is installed, and continued after the introduction. This will supplement the small scale, but valuable, work which has already been carried out at CERL, Leatherhead.

There are a number of disadvantages associated with desulphurisation including:

a) The use of large quantities of limestone.

b) Problems with the disposal of large quantities of calcium sulphate (1.1 million tonnes pa gypsum).

c) Reduction in efficiency of power generation. There will be an increase in carbon dioxide emissions of some $4\frac{1}{2} - 5\%$, i.e. there will be an *increase* in contribution to the "greenhouse effect".

d) An increase in the price of electricity from Drax by 10 - 15% which will be passed on to the general public and industry. Whilst this may not be regarded by the richer members of society as significant it must be remembered that it will be important to poorer members and the elderly.

It is vitally important to assess whether the vast desulphurisation programme brings about substantial improvements and justifies the installation and operating expenditure and other disadvantages which will be entailed by desulphurisation at Drax.

BYROM LEES MSc
Fuel Technology Consultant

References

1. Chester, P.F. "Perspectives on Acid Rain" in *Journal of Royal Society of Arts,* vol 131, p. 587. 1983
2. Chester, P.F. *Electricity and the Environment.* British Association for the Advancement of Science, 1988.
3. Manning, M. "Corrosion of Building Materials due to Atmospheric Pollution in the UK" in *Acid Pollution, Acid Rain and the Environment.* Watt Committee on Energy, 1988. Report No. 18, p. 40.

BOOKS & REPORTS

THE ENVIRONMENTAL POLICY OF THE EUROPEAN COMMUNITIES

Stanley P. Johnson and Guy Corcelle. Publisher: Graham & Trotman, 1989. £47.00. ISBN 1-85333-225-9

An extremely useful and comprehensive guide to European Community environmental legislation, this book includes the texts of the main Directives. The first part of the book deals with the basic sectors of Community environment policy — water, air, waste, noise, etc; the second part looks at specific aspects, such as preventive actions, economic aspects, research, environment and development aid, and monitoring environmental Directives. The main text of the book was completed at the end of 1988.

EEC ENVIRONMENTAL POLICY AND BRITAIN (2ND REVISED EDITION)

Nigel Haigh. Publisher: Longman, 1989. £27.50. ISBN 0582 05959 3

This book, which was first published in 1987, remains an invaluable reference book, despite the fact that this second "revised" edition is not significantly different from the 1987 edition. Although the appendix listing adopted Directives has been updated to 31 May 1989, the main chapters of the book make no reference to any adopted after July 1987 (except in their form as amendments or proposals). Also those parts of the main chapters which deal with relevant British legislation and further development could do with updating. There is a postscript at the end of the book covering some of the important developments since 1987.

ASH WORKPLACE SERVICES SMOKING POLICY MANUAL

Action on Smoking and Health, £50.00 inc p & p. Available from ASH, 5-11 Mortimer Street, London W1N 7RH

While most of us can choose whether to be polluted — and possibly harmed — by other people's smoke at home, at work this may not be so. However, as awareness of the dangers of passive smoking has grown, so too have the demands of non-smokers to breathe smoke-free air at work. Indeed according to a National Opinion Poll survey carried out in 1987, even most smokers (81%) agree that non-smokers have a right to breathe smoke-free air at work.

To help employers introduce a workplace smoking policy ASH Workplace Services have produced a manual which includes information on setting up a smoking policy working party, raising the issue with the workforce, what the law says on smoking at work, and different smoking policy options. ASH Workplace Services also offer a fee-based consultancy service.

A CLEANER, FASTER LONDON: ROAD PRICING, TRANSPORT POLICY AND THE ENVIRONMENT

Patricia Hewitt, Institute for Public Policy Research. £10.00. ISBN 1 872452 00 0. 1989

The need to solve increasing traffic congestion in Britain's cities and reduce pollution from exhaust emissions are issues of widespread public and political debate. Road pricing — whereby motorists pay a fee to use particular roads either at any time of during specific periods — is one option currently under discussion. In this paper, Patricia Hewitt examines various schemes in Hong Kong, Singapore, Sweden and Norway, and then looks at how a system of road pricing could work in London. It is proposed that revenues so raised should for the main part be used on improving public transport.

MONITORING OF LANDFILL GAS

Institute of Waste Management, 3 Albion Place, Northampton NN1 1UD. £10.00

These guidelines produced by an IWM Working party, are intended as a useful working tool for those engaged in landfill site management, monitoring, regulation and control. As such, it complements *Waste Management Paper No.27, The Control of Landfill Gas (HMSO, 1989).* The working party received assistance from specialists with expertise in particular aspects of landfill gas monitoring, which helped to highlight areas in which there is conflicting opinion on, and insufficient knowledge of, the properties, migration and detection of landfill gas. The guidelines attempt to highlight criteria pertinent to the prediction of gas migration pathways, examine the variety of monitoring equipment available and appraise critically the limitations and pitfalls which can affect the results obtained.

The practical aspects of monitoring and predicting gas migration pathways are dealt with and guidance given on conditions dealing with gas control for incorporation into disposal site licences, with the objectives of achieving high, nationally uniform standards of control.

AIR POLLUTION (THE HANDBOOK OF ENVIRONMENTAL CHEMISTRY VOL. 4 PART B)

Ed. O. Hutzinger. Publisher: Springer-Verlag, 1989. ISBN 0387509151

Part of a five volume series, the aim of the handbook is to aid understanding of the basic distribution and chemical reaction processes which occur in the environment. Directed at postgraduates and practising scientists, it covers specific air pollutants, effects and control equipment.

CAREERS IN CONSERVATION (4TH EDITION)

John McCormick. Publisher: Kogan Page 1989. £4.95. ISBN 0749400137

Fourth edition of useful guide covering potential areas of employment, employers and courses for aspiring professional planet savers. The "updating" in this edition however is not comprehensive.

ENVIRONMENTAL HEALTH REFERENCE BOOK

M.H. Jackson, G.P. Morris, P.G. Smith, J.F. Crawford. Publisher: Butterworths £70.00 ISBN 0408026006

A comprehensive and fascinating guide covering all aspects of environmental and public health and safety — everything from disease, food hygiene, house defects to environmental pollution. Clear and concise, it details problems and methods of control — with emphasis on technical aspects rather than legislation — the perfect complement to the NSCA *Pollution Handbook!*

THE NATURAL HOUSE BOOK

David Pearson. Publisher: Conran Octopus, 1989. £14.99. ISBN 1850291756

The book that tells you how to create a 'healthy, harmonious and ecologically sound home'. Lots of attractive colour illustrations of 'the house of tomorrow' and its user friendly living spaces, with health promoting colour schemes, materials, lighting and heating. However, the practical problems most of us are presented with are that our budgets are limited, our homes are probably half the size of the illustrated natural kitchen and happen not to be surrounded by leafy vegetation.

THE FRAGILE ENVIRONMENT

Ed. L. Friday, R. Laskey. Publisher: Cambridge University Press. £12.95. ISBN 0521363373

Compiled from the Darwin College Lecturers, the eight contributions look at different aspects of the changing global environment and outline approaches to the problems.

BIOLOGICAL INTERACTION OF INHALED MINERAL FIBRES AND CIGARETTE SMOKE

Ed. Alfred P. Wehner, Dvara-Lee Felton. Publisher: Battelle Press 1989. $87.50. ISBN 0935470441

Proceedings of an international symposium/workshop on the combined effects of tobacco smoke and mineral fibres. The proceedings represent current thinking by experts in the field.

ACOUSTICS AND THE BUILT ENVIRONMENT

Anita Lawrence. Publisher: Elsevier Applied Science, £43.00. ISBN 1851663088

The book sets out to bridge the gap between the science of acoustics and the practical requirements of those involved in design and construction. The introduction gives the theory of sound and its perception by people, and sources of noise in the community. This is followed by chapters on acoustics and building design, with worked examples to demonstrate the application of acoustic principles.

FUTURE EVENTS

1 MARCH — ONE DAY CONFERENCE: ENVIRONMENTALLY RESPONSIBLE PROFILE

How to develop and communicate an environmentally responsible profile.
Venue: The New Connaught Rooms, Great Queen Street, London WC2.
Details: Institute for International Research, 44 Conduit Street, London W1R 9FB. Telephone: 01-434 1017 Fax: 01-437 3322.

5-7 MARCH — THREE DAY WORKSHOP: RISK ASSESSMENT IN THE PROCESS INDUSTRIES

Quantified Risk Analysis (QRA) techniques are now being used at every stage in the life of a project to assess the potential of a process to harm the workers on the site and the people who may live and work nearby. Increasingly, QRA is being used to identify the major risk-causing elements of a process and allow resources to be targeted to maximise risk reduction potential. The coupling of QRA with cost benefit analysis provides a powerful means of making decisions on what is 'reasonably practicable'.
Venue: Hotel Chester Grosvenor, Chester.
Details: Sara Mountford, IBC Technical Services Ltd, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Telephone: 01-236 4080 Fax: 01-248 2964.

12-13 MARCH — INTERNATIONAL CONFERENCE AND EXHIBITION: CHEMICAL WASTE INCINERATION — MATERIALS, MANAGEMENT AND CONTROL

The meeting will consider all aspects of high temperature oxidation, materials selection and emission control associated with the disposal of chemical waste.
Venue: Hotel Piccadilly, Manchester.
Details: Sara Mountford, IBC Technical Services Ltd, Bath House, 56 Holborn Viaduct, London EC1A 2EX. Telephone: 01-236 4080 Fax: 01-248 2964.

27-29 MARCH — WORKSHOP: TRANSPORTATION AND THE ENVIRONMENT

Road transport is an integral feature of modern life, moving people and goods for industry, commerce and pleasure, but traffic is also a social menace. Air pollution, noise, road accidents and traffic congestion are the price we pay for our increasing use of motor vehicles. NSCA's annual workshop will explore the problems, prospects for emissions control and policy options.
Venue: Henderson Hall, Newcastle-upon-Tyne.
Details: Peter Mitchell, NSCA, 136 North Street, Brighton BN1 1RG
Telephone: 0273 26313.

3-5 APRIL — CONFERENCE: EFFLUENT TREATMENT AND WASTE DISPOSAL

Tightening environmental legislation and efficiency of manufacturing practices significantly increase pressures on effluent treatment and waste disposal from all sources. The conference will bring participants up-to-date with the latest developments and experience in applying traditional and novel processes.
Details: The Institute of Chemical Engineers, 165-171 Railway Terrace,
Rugby CV21 3HQ Telephone: 0788 78214.

24-25 APRIL — 26TH CONSULTATIVE CONFERENCE: TECHNOLOGICAL RESPONSES TO THE GREENHOUSE EFFECT

The main emphasis of the Conference will be on methods by which the energy industries themselves can reduce CO_2 emissions. These include using fossil fuels more efficiently, switching to fuels that emit less CO_2, combined heat and power and the use of substitutes for fossil fuels, including nuclear power and renewables.
Venue: Royal Geographical Society, London.
Details: Mr. J.G. Mordue, The Watt Committee on Energy, Savoy Hill House,
Savoy Hill, London WC2R 0BU.

30 APRIL-1 MAY — TWO DAY CONFERENCE: THE ROUTE AHEAD

A Worldwide Fund for Nature Conference on road transport and the greenhouse effect.
Venue: London Press Centre, London EC4.
Details: Jane Dunmore, Conference Organiser, 46 Arundel Street, Brighton BN2 5TH

6-8 JUNE — THREE DAY CONFERENCE AND EXHIBITION: THE FUTURE FOR NOISE CONTROL — TOWARDS AN INTERDISCIPLINARY APPROACH

The effective prevention and control of noise requires an interdisciplinary approach involving not only noise specialists but also architects, planners, highway and traffic engineers, educationalists and policymakers. Main themes of this international conference are Transportation noise; Industrial noise; Neighbourhood noise, Noise and building design; Noise measurement; Noise legislation and planning; Noise education and training; Social, economic and psychological aspects of noise; Health and medical aspects of noise; Interdisciplinary co-operation. The conference is organised by NSCA on behalf of the International Association Against Noise.
Venue: Brighton Conference Centre, Brighton.
Details: NSCA, 136 North Street, Brighton BN1 1RG
Telephone: 0273 26313 Fax: 0273 735802.

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